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Industrial Mobilization

Major General E. S. Hughes, *U.S. Army*
Chief of Ordnance

THE deliberate and wanton attack of the Axis nations on this country during the war just past impressed on our thinking people one fact: That the peace terms that were to have been dictated "in the White House" could be so dictated in the future if we do not keep our defenses strong.

There is some argument as to how far the nation wishes to go in this direction in some phases of preparedness, but not in all. Plans for industrial mobilization are making progress. A point at issue for many years in Congress and among the public, the theme of industrial readiness for a war emergency now has a chance for more than fair success. Congress, reflecting the hopes and prayers of the people that we may be able to maintain the strength, in being and potential, that will keep the nation out of war, is behind the planning. The Army, the Navy, and the Air Forces, as well as numerous civilian organizations, are doing the planning and the work that goes with it.

Much has already been done. Much remains to be done. Present planning is on a continual, day-by-day basis, and the action inherent in that planning is going forward at the highest possible speed. Indeed, there is already a certainty that civilian industrial facilities are now to be used more fully than ever before in peacetime. It is possible, although I will not presume to predict it, that munitions production on a large scale may be started in a matter of weeks in any future emergency as contrasted to months and years in the past.

Lessons of the Past

Prior to World War I, an attempt was made to establish a system of educational orders to private industry so that knowledge would be gained of military matériel production. The attempt ended with failure. Further efforts in that direction, during the 1920's and the early 1930's, led finally to the passage of Public Law 639, 75th Congress, in June 1938. In that Act, Congress provided funds for the first time for placing small orders with commercial firms so that the problems of mass production of many items that are wholly unlike peacetime products might be worked out. But the sum—$2,000,000 for each of five years—was small. A very important provision of the Act was that which allowed solicitation of bids from firms selected for their competence. Previously anybody could bid, whether or not qualified or tooled up to make the matériel, and the lowest bidder always got the contract.

The manufacturing arsenals of the Ordnance Department had been carrying on the chain of knowledge of munitions production on a very skimpy basis, and the funds allowed by Public Law 639 gave little promise of changing the situation materially. More than anything else, it was a milestone marking progress in a two-decades fight.

The first phase of educational orders

covered just six items. Four of these—the semiautomatic rifle, recoil mechanism of the AA gun mount, forging of the 75-mm shell, and machining of the same shell—were Ordnance items. Considering the hundreds of types of shells and bombs needing attention, to say nothing of the large number of other major Ordnance items, satisfactory results were still far in the future. We saw at that time only a scratching of the surface.

In 1939, however, with aggression threatening the peace of the world, an amendment allowed 35½ millions on the program for 1939, 1940, and 1941. Even that amount was not enough for the necessary expansion. To aggravate the situation, some manufacturers were reluctant to face the contemporary propaganda against munitions making. Yet it should be recorded that a few not only entered the program whole-heartedly but also voluntarily concentrated on problems in arms research and mass production without a cent of charge to the Government. Then, when the President asserted that the country must become the Arsenal of Democracy, after most of Europe had fallen to the Nazis, there was but little further hesitation. Many manufacturers entered the program and worked vigorously.

Despite the period of grace given us by the valiant fight of the British, December 1941 found us woefully unprepared for the war. Our industries had had time to gain but little knowledge of arms production, and they were ill-equipped for the monster job ahead in respect to plants, tools, and trained manpower. The nation had few munitions on hand, and certainly would need previously undreamed-of quantities.

From scratch, the nation started building factories and making machine tools. The former was not too difficult, though time-consuming; but the latter required every ounce of ingenuity we could muster. Machinery was adapted to jobs for which it had never been intended; arsenals, warehouses, and junk yards were searched for any idle tool that could be renovated and put to work; and machine tool manufacturers worked intensively to make the many special tools needed. Yet the machine problem remained a large one until the very end of the war.

Thus an important lesson was learned. Another resulted from our lack of trained manpower, of which we had but small cadres in the manufacturing arsenals. Because of this fact, commercial manufacturers were forced to send small groups of skilled men to the arsenals for intensive training at a time when the latter were burdened with the responsibility of expanding, training their own new employees, and at the same time carrying the interim load of necessary production. It is to the credit of all concerned that arsenal production increased enormously while, at the same time, training was carried on successfully.

These continuing handicaps and those concerned with production engineering on newer matériel, constant expansion and cutbacks of contracts, allocation of the necessary materials, and the like, did not prevent full realization of America's manufacturing potential. The final result, long delayed because of prewar unpreparedness, was as near all-out concentration of industry on one problem as may ever again be possible. Indeed, it is to the credit of American industry that there was excellent coordination of corporations, singly and in groups, and of management and labor. The will to win was so strong in all strata that the cooperation of all was of a very high order.

Insurance for the Future

Even while the war was in progress, Ordnance (and others, too) foresaw the need for specific, rather than general, industrial mobilization planning. As early as 1943, plans were underway in Ordnance

to set up a war reserve of machine tools. Particular attention was to be paid to special purpose tools which would very likely be slated for the junk heap when no longer needed for war matériel production. These and many others were earmarked while in production, so that there would later be no question as to their storage against a future emergency. Ordnance collected in this manner and stored more than 7,000 precious machine tools before the beginning of the JANMAT (Joint Army-Navy Machine Tools) program which will be discussed later.

When war came to Europe, this country had only enough TNT to sustain her in a few days' fighting. Half of that she gave to Britain after Dunkirk. Our only explosives plant was Picatinny Arsenal, and there was but a minute commercial production. The Government, therefore, began building plants as rapidly as possible for making the components of ammunition and for loading shells, fuzes, and bombs. Dozens of plants were built and equipped.

Foreseeing the possible dismantling of these plants in a postwar fever for disarmament, Ordnance and the War Department as a whole planned to keep a minimum number of these in standby condition. Before the fighting was stopped, these plans had taken such shape with the approval of the Secretary of War, that many plants are intact today. For a minimum of maintenance expense in comparison with their value, these could go into production on a war basis with little delay. Make-ready time in an emergency would thus be cut considerably.

Continued storage of left-over wartime matériel is another method of easing industry's possible load. A wide variety of items have been specially prepared for long-term storage and put away against a future need. Ammunition is the outstanding example. Of this commodity, there is now on hand in storage here at home more tonnage than there was here at any time during the war when it was being shipped overseas rapidly. The latest figures show a total of over 8,000,000 tons in storage, or more than a full year's production at wartime's highest rate.

These things, however, are historical accomplishments. They do not indicate present activities, nor insure the future more than a measure. It is of today and tomorrow that we are more concerned. That, too, is promising.

Some of Ordnance's Government-owned plants will remain in simple standby for an indefinite future period. Most of these are to be leased, wholly or in part, to private industry. This latter program will enable the plants to pay their own upkeep, will maintain them in instant readiness for war work. And, since all leases of such plants will contain a recapture clause so the Government can take them back if war should come, they comprise a preparedness program of their own.

In addition, there are now in operation portions of several standby Government plants making ammonium nitrate fertilizers, under the War Department program, for overseas use. Present operation keeps these plants in readiness for any emergency.

In November 1946, the collection of machine tools entered a more comprehensive phase with the establishment of the JANMAT program. Under a joint committee of the Army, Navy, and Air Forces, teams composed of experts from these services enter plants and warehouses after the War Assets Administration has chosen all tools needed in the civilian economy, and earmark for long-term storage special selections from the remainder.

JANMAT's aim, as with that of Ordnance's war reserve, is to find, especially, those tools which private industry cannot use to advantage and yet would be difficult to duplicate if we needed them in a hurry for war production. Its goal is 70,000 machine tools, and its teams had

gathered about 20,000 of all types by the end of April 1947.

Present operation of the Ordnance manufacturing arsenals is, of course, much reduced from the wartime peak. But they are in a better state of readiness than they were before the war. To the six prewar plants, a seventh has been added—the Detroit Arsenal where development and manufacturing work on tanks and other combat vehicles is carried on. Together, the seven will function much as they always did, with the exception, I believe, that their manufacturing programs will continue larger in proportion to the change in preparedness thinking.

These three things: continuation of the standby status of plants, the collection of large numbers of machine tools, and the larger scope of arsenal activities, all augur well for the future. They do not, however, take private industry in account.

Since the end of the war, we in Ordnance have stressed the need for full-scale cooperation between wartime producers of ordnance matériel and the Ordnance Department. The response has been good. Practically gone is the old fear of being called "warmongers" and in its stead there is the conviction that the nation needs industry and that industry needs the nation; that without cooperation, both might perish in an emergency.

Industry is regularly conferring with us, asking our advice and volunteering information that is vital. Very much as in wartime, we are poring over the same drawings, working over the same production engineering problems, planning together the necessary moves in industrial mobilization. Industry is going further, however. On its own, it is working out peacetime production plans—for production that is generally too small for profit—and therefore based only on the known need for keeping alive the art of munitions making on a wider scale than the arsenals can keep it. With only fair-sized contracts, some of them have volunteered to assemble the necessary machines and operate pilot lines primarily to keep the chain of knowledge unbroken.

I speak for the Ordnance Department. That, however, is only a part of the story. Even so, this discussion would be far from complete without mention of the Army Ordnance Association, that large civilian organization of ordnance enthusiasts who are preponderantly industrialists.

Since World War I, the Association has carried on a splendid fight for national awareness of the dangers of apathy in armament matters. Perhaps no other group within or without the Government strove so consistently and for so many years for the right to give industry educational orders. Certainly no other civilian group has done so much in promoting what I call the Science-Industry-Ordnance Fraternity.

In conference with the Army Ordnance Association, it has been decided that, henceforth, the Ordnance Department will keep industry informed through the Association. The Association will thus be the liaison to tell manufacturers our plans for production, the problems we have for them to solve, ways in which cooperation and coordination may be made more effectual. Five active committees of the Association—on artillery, fire control, gauges, small-arms ammunition, and small arms—have already sat in conference with us a number of times, and put much effort into the solving of our mutual problems. Members of these committees are key industrialists, and when they speak for the companies of which they are executives, their attack on problems is direct and followed by action.

Typical of their approach is the statement of one of them, president of a nationally known company, at a recent meeting. He said, in effect, that his firm and those of other committee members must

consider the problem before them as being as much theirs as that of the War Department. He went on to say that they must do the job despite the actual loss to them in dollars, that they must realize the Ordnance Department could not possibly do it alone, and that "we are all in this together; must stand or fall together."

Industrial engineering of the sort these men carry on is vital. Recognition of this fact is seen in the present aim of the Army-Navy Munitions Board to develop an industrial mobilization plan that is larger, more all-embracing than any attempted before in peacetime. Some phases of the plan have already been activated, while top military and industrial experts are working out others. One of the former is the JANMAT program.

Now in preparation as part of this plan is a volume which will detail the organization and operation of various production control agencies which would be necessary for most efficient production and allocation of facilities during any future war. It will cover, further, the responsibility of each and the relationship of each to the others. It will be up to date in that it will be based upon newer developments in both the military and industrial arts.

Studies of allocations and materials and the coordination of requirements and purchases of the services, such as preparation of this volume report entails, will lend naturally to greater and greater standardization of many types of equipment. The advantages in that respect are obvious.

To make more certain the availability of industrial raw materials, the Board will also stockpile large quantities of some strategic commodities. The types and quantities are not being advertised for obvious reasons, but the Board has been given a sizeable sum to spend this year for minerals, metals, chemicals, and the like.

In view of the devastation wrought by air bombing, and particularly since the atomic bomb was first used, there has been considerable talk of the necessity for relocating industrial areas. Arguments run all the way from consideration of dispersal of individual factories to the question of underground plants. The Board has, therefore, recently initiated a comprehensive fact-finding study of the latter question. From this it is hoped to arrive at answers that will assist industry to decide what to do and how to do it in case of necessity.

Present Status

Working on and with the committees and boards discussed above are many noted industrialists, and high-ranking organizers and officers of the Army and Navy. Cooperating with them is an impressive array of corporations. The Ordnance Department is particularly fortunate in this regard, for its wartime producers were in the top rank in both capacity and technology.

I find, however, that there are a few, even among the larger firms, who are too preoccupied in filling the backlog of demand for consumer goods to enter the planning phase of this national drive. Doubtless they will come in with us soon. A few others—and only a few, fortunately—are still watchfully waiting to discover the direction and strength of public reaction, as though it could be anything other than favorable after the experiences of the past war.

"Life or Death"

There is no need for me to reiterate the seriousness of the problem of industrial mobilization planning. "Time is of the essence" is a phrase which, though threadbare from constant use, still expresses best the need for present action. We have time now; we would have none after an attack upon us.

War need not be a necessary eventuality to prove the contention that we must be

prepared against its coming. I hope it is not thrust upon us under any circumstances. But too much is at stake for us to take any chances; we cannot afford the luxury of being weak. Let us try being strong! Present thinking and present activities lead me to believe that most people are convinced that a strong, prepared America is the best guarantee of a peaceful America.

Much—I repeat *much*—remains to be done, but on the whole I am optimistic.

We can never again hope for the two or three years of "clear warning" which will allow us to pull the lever and start to implement our paper plans two years before we know a shooting war will commence. That means that in addition to stockpiles of critical materials and in addition to stand-by plants we must also have stockpiles of critical machines. In the case of those critical items of munitions requiring a long time for production, such as heavy bombers, we must have production lines in actual operation all the time. A heavy munitions or military aircraft industry simply cannot be created overnight. Either we will have it in being if and when we are attacked or we may never have it. In these fields industrial preparedness will require actual readiness—all the time.

Lieutenant General J. Lawton Collins

Future war will be total war and will not be waged solely by or against people in uniform. Therefore, industrial preparedness, civil defense and mobilization of total resources for war assume at least equal importance with our particular problem of mobilizing military manpower.

Major General Manton S. Eddy

Eighth Army's Role *in the* Military Government of Japan

Lieutenant Colonel Henry L. Hille, Jr., *Corps of Engineers*

The task of the Eighth Army is an unusual one, since so many of its functions are non-military in character. For example, we transport, store and release when needed, food from the United States for the Japanese people. We supervise the building of roads, bridges and air fields; our military commissions try Japanese war criminals, and we also supply provost courts for the trial of minor offenders. Perhaps the largest single task of the Eighth Army, however, is the implementation of SCAP directives through our Military Government. That intricate picture is the one presented in the following article.—Lieutenant General Robert L. Eichelberger, Commanding General, Eighth Army.

Orientation

GENERAL Douglas MacArthur's system for the Military Government of Japan is remarkable in that, from the first day of the occupation, as Supreme Commander for the Allied Powers (SCAP), he has exercised his military government functions by means of instructions issued directly to the Imperial Japanese Government. Neither Headquarters, SCAP, nor any subordinate agency has ever displaced any element of the organizational pyramid of the Japanese government. As the world knows, to date General MacArthur's "one man Military Government" has been extraordinarily successful. In this brief article, I will not attempt to develop in any detail the organizational methods or problems of Headquarters, SCAP, but will limit myself principally to the role of the Eighth Army as the chief instrument of the Supreme Commander on the military government field operational level.

In discussing our military government duties it is necessary to keep in mind the ultimate objectives of the Allied Powers. These are: first, to insure that Japan will not again become a menace to the peace and security of the world; and, second, to bring about the eventual establishment of a peaceful and democratic government which will reflect the ideals and principles of the Charter of the United Nations. It is contemplated that this government will be one evolved and supported by the freely expressed will of the Japanese people, not one imposed on her by the Allies.

The first twenty-two months of the occupation have been ones of rapid and uninterrupted progress toward the accomplishment of the Allied objectives. Japan has been completely disarmed and demilitarized. Most leaders and institutions expressive of ultra-nationalism and militarism have been eliminated. A political atmosphere has been created that is highly favorable to the development of a truly democratic nation. The SCAP-sponsored economic program has been fraught with many difficulties, but considerable progress has been made toward rebuilding a destroyed economy to meet the basic requirements of the Japanese people.

The functions of Headquarters, Supreme Commander for the Allied Powers, blanket the entire economic, political, social and cultural structure of Japan. Not only do its experts serve to screen Japanese national life to eliminate all undemocratic and ultra-nationalistic elements from it, but they also engage in a complete constructive analysis of the nation and supervises its rehabilitation along sound democratic lines. It intervenes as little as possible in detailed Japanese governmental matters, requiring the Japanese themselves to take the initiative and do the work to the greatest extent allowable.

Eighth Army Occupation History and Missions

Eighth Army activities in Japan may be divided into two historical phases. From the day of our first airborne landing on 30 August 1945 until the end of that year we were heavily involved in getting established and building up our forces, facilities and organization. In this period, Eighth Army occupied Japan from the Tokyo-Yokahama area northward; Sixth Army, coming in later, eventually controlled the area to the south. Initially, our major concerns were establishing ourselves ashore, progressively occupying our area, supervising the demobilization and disarmament of the Japanese forces, and liberating the Allied prisoners of war and internees held in Japan. In eighteen days we recovered all Allied personnel, about 24,000 persons. By the end of a month and a half, the Japanese General Staff had been dissolved and almost all of the four and a half million men of her army and navy had been demobilized without incident. It is significant that, from the first, all plans were predicated upon the full cooperation of the Japanese and that the enemy forces were disarmed and demobilized rapidly and efficiently under their own supervision, no seizures being accomplished by Allied personnel.

By the end of the year, we were well established and the occupation program was progressing smoothly. We had managed to provide adequate winter housing for our troops, had restored shattered communications and other logistical facilities, and had our vast redeployment program under way. The program for the repatriation of millions of people to and from Japan, and that for the collection and destruction of all war matériel were in full swing. The rapid flow of military government trained personnel from the United States had permitted us to set up an efficiently operating organization for military government by the third month of the occupation, and we were playing our part in such matters as apprehending and prosecuting war criminals, dissolving ultra-nationalistic institutions, releasing political prisoners, promulgating woman suffrage, democratizing the educational system, and re-establishing a sound internal economy for Japan. The great majority of Japanese officialdom and the people cooperated fully. There was no disorder or organized resistance to SCAP authority.

When Eighth Army took over the occupation responsibility for all Japan on 31 December 1945, we were ready to enter our second phase. We were in a position to devote the bulk of our effort to executing our long range occupation missions, rebuilding a new army from what was being left us by the redeployment program, and providing facilities for the Occupation Forces on a more generous and permanent basis. Briefly, our principal missions today are: to provide a force to maintain order and to enforce SCAP directives; to operate the field organizations for military government in Japan; to continue to supervise the repatriation program; and to provide logistical support for the Occupation Forces.

Eighth Army Organization for Military Government

The Commanding General, Eighth

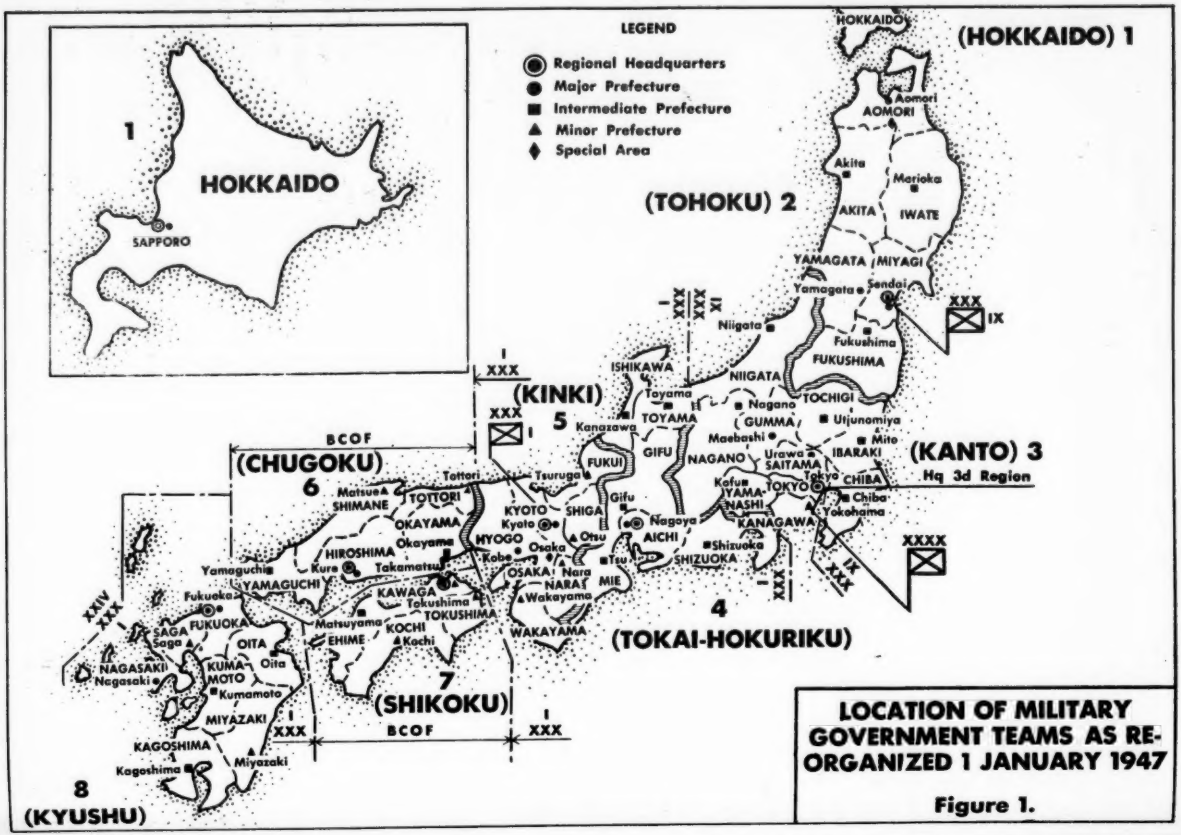
Army, Lt. Gen. R. L. Eichelberger, is charged with the operational aspects of military government. The Supreme Commander announces all policies and issues all orders to the Japanese government. He then issues instructions to the Eighth Army detailing the nature and the extent of our supervision of the Japanese in carrying out specific directives. If no specific directive is issued us, we analyse the order to the Japanese government and exercise general surveillance as indicated. Eighth Army implements the policies and directives of the Supreme Commander, makes recommendations concerning conditions in the field, and reports failures of lower echelons of the Japanese government or the Japanese people to carry out instructions or policies.

There are three principal agencies concerned with military government: the Military Government Section, a special staff section of Headquarters, Eighth Army; a field organization based on two corps headquarters and special military government units; and the occupation troops in normal command channels.

The military government section of Eighth Army Headquarters is charged with assisting in all matters pertaining to military government and takes staff action within the policies laid down by SCAP and Eighth Army. Its duties include all matters of organization and control of military government, recommendations on matters pertaining to the internal economy and the national life of Japan, and maintenance of liaison with other agencies concerned with military government.

Operating generally under the supervision of the Military Government Section is our field organization for military government (see Figures 1 and 2). The only tactical headquarters incorporated in the "military government chain of command" are the two corps headquarters. Geographically, the organization is laid out generally in parallel to Japanese governmental organization on the prefectural level. (A prefecture corresponds to a state in the United States.) For purposes of administration and control, prefectural teams are grouped under regional military government teams. It will be noted that the special team servicing the great Kanagawa Prefecture-Tokyo Prefecture metropolitan area and the two regions in the area occupied by the British Commonwealth Occupation Forces are directly under Eighth Army Headquarters.

Originally six Military Government Groups and twenty-nine Military Government Companies organized under War Department tables of organization comprised the field organization. Since available units did not correspond in number to the prefectures of Japan and since field teams must keep in close contact with prefectural governments, it was necessary in many cases to break down the standard units into detachments. This disruption of units resulted in a not entirely efficient application of available qualified personnel to the work at hand. As a result, on 30 June 1946, the old units were inactivated and the units generally described on Figure 2 were formed. Strict economy in the use of critical personnel was achieved by establishing three types of prefectural teams and two special teams in accordance with the relative importance and special requirements of areas. Strengths of teams varied from the six officers and twenty-five enlisted men of the Minor (prefectural) Military Government Team, to sixty-seven officers and 150 enlisted men in the Tokyo-Kanagawa Military Government District Team. With the reorganization, our total military government field strength dropped from 2,800 to 2,288. This new organization proved very successful, except that we experienced great difficulty in filling our spaces with properly qualified personnel.


LEGEND
Regional Headquarters
Major Prefecture
Intermediate Prefecture
Minor Prefecture
Special Area
1
HOKKAIDO
SAPPORO
HOKKAIDO
(HOKKAIDO) 1
Aomori
AOMORI
Akita
Morioka
AKITA
IWATE
(TOHOKU) 2
YAMAGATA
MIYAGI
Yamagata
Sendai
XXX
IX
Niigata
Fukushima
FUKUSHIMA
NIIGATA
ISHIKAWA
Toyama
TOCHIGI
Nagano
GUMMA
Utsunomiya
TOYAMA
Kanazawa
Maebashi
Mito
BCOF
(CHUGOKU)
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GIFU
NAGANO
Urawa
SAITAMA
IBARAKI
(KANTO) 3
Hq 3d Region
Matsue
SHIMANE
TOTTORI
Tottori
Tsuruga
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Kofu
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CHIBA
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Shizuoka
SHIZUOKA
HIROSHIMA
Okayama
Kure
Takamatsu
Yamaguchi
YAMAGUCHI
OSAKA
Nara
NARA
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KUMA-MOTO
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KAGOSHIMA
Miyazaki
Kagoshima
7
(SHIKOKU)
8
(KYUSHU)
LOCATION OF MILITARY GOVERNMENT TEAMS AS RE-ORGANIZED 1 JANUARY 1947

Figure 1.

SCAP

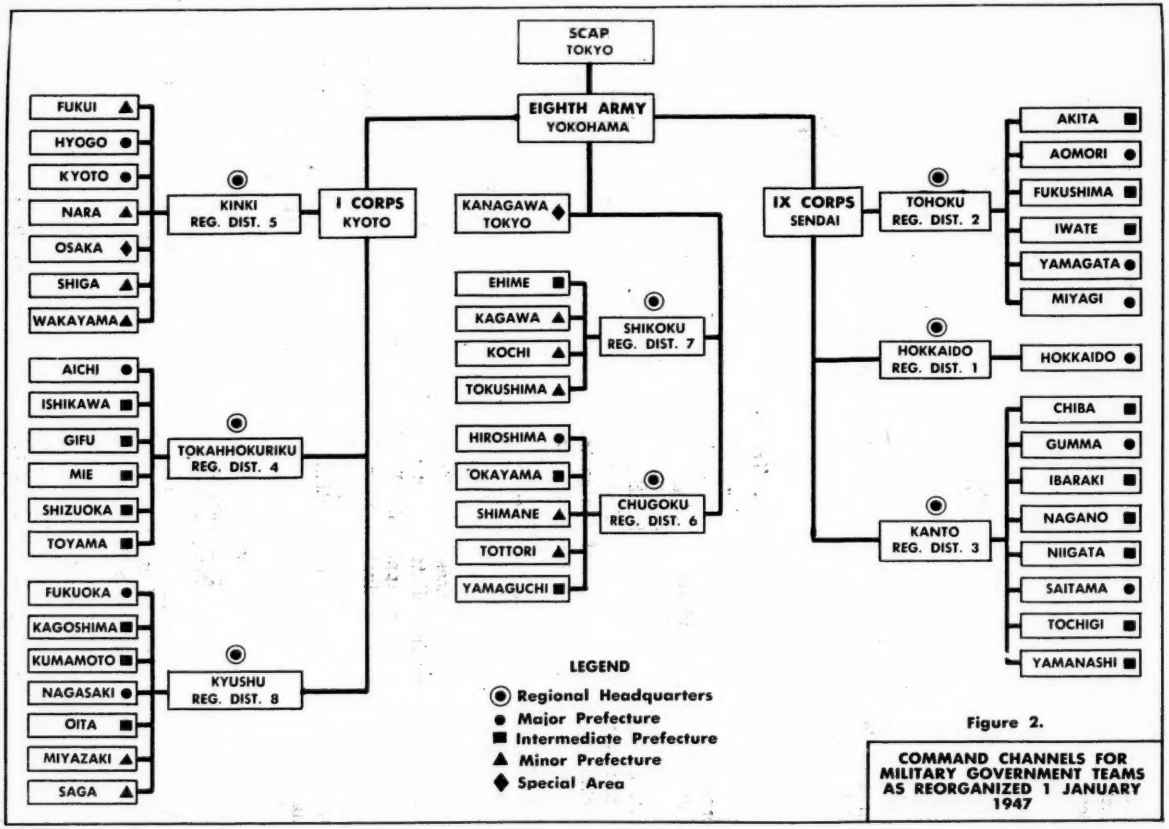


Figure 2.

COMMAND CHANNELS FOR MILITARY GOVERNMENT TEAMS AS REORGANIZED 1 JANUARY 1947

On 1 January 1947 and 1 July 1947, further minor reorganizations were effected to arrive at the final organization described in Figure 2. A specific allotment of civil service personnel was made to the teams whereas, previously, civilians were substituted for either officers or enlisted men. The present bulk allotment consists of 398 officers, 1,436 enlisted men and 605 civilians. In the new organization civilians hold positions of widely varying degrees of responsibility. In the Tokyo-Kanagawa Team, twenty-eight civilians are slated for former officer positions and thirty-five for those formerly held by enlisted men.

The prefectural teams are the "front line units" of military government. Their organization provides for experts in the fields of commerce and industry, legal and government matters, information and education, civil property, public health, and public welfare. Operating in close daily contact with the agencies of the central Japanese government, of the prefectural governments and local governing bodies, they execute intimate "on the spot" supervision and surveillance of the execution of SCAP directives and ferret out violations and non-compliances. The teams act by rendering immediate reports with recommendations where applicable. In addition, they provide invaluable advice and assistance to local Japanese authorities and gather a mass of information on many subjects which is reported in periodic and special reports.

The third instrument of military government, the combat and service troops in normal command channels, are utilized only on special missions which require manpower and facilities beyond the means of military government teams. For example, detailed surveillance of the Japanese national elections in 1946 and 1947 were performed by the military government echelon heavily reinforced by tactical troops. Similarly, supervision of the demobilization and disarmament of Japanese armed forces, as well as the vast project for the destruction of all war matériel, was executed largely by our combat echelon. The system of Military Occupation Courts, in which Japanese and other nationals are tried for offenses inimical to the objectives or security of the Occupation Forces, are operated largely by non-military government personnel, although the latter personnel are engaged in investigation and preparation of many cases for trial.

Military Government Operations

Included among our most important activities are the following subjects which I will discuss below:

Economics.
Public Welfare.
Public Health.
Civil Information and Education.
Repatriation.
Legal and Government Matters.
Procurement.

Economics

The work of the Economics Section is perhaps of most immediate importance. Two major problems have presented themselves: first, the stimulation of all phases of Japanese production; and second, the custody, control and inventory of some 900 industrial plants being held for reparations.

Eighth Army has been heavily involved in locating, describing, inventorying, safeguarding and maintaining reparation plants. As far as possible, the physical duties of inventory, safeguarding, and maintenance have been conducted by the Japanese under the close supervision of military government units in the areas concerned.

Immediately after the surrender, Japanese industry was at a standstill. Although controls on the conversion of wartime potential to production of peacetime needs were required, it was made a

general policy that economic initiative be left with Japanese industry. The initial reaction was a do-nothing attitude by the Japanese, particularly in the cases of plants which they thought might be held for reparations. As a result, our military government found itself not only acting in the negative capacity of issuing permits and surveying reports of production of restricted industry, but also of assuming active local leadership in a drive to educate, encourage, plan and solve innumerable problems to the end of getting essential peacetime industry moving. The retarding forces of demilitarization, abolition of monopolies, selection of reparations plants, unfavorable trade balances, unstable currency, labor unrest and displacement, and food shortages have all been problems of major concern to Eighth Army as well as to SCAP.

Most detrimental to the recovery of Japanese industry has been, and is, the shortage of raw materials, particularly food, coal, fertilizer and steel. The major obstacle to increased production is the shortage of coal. Coal production is held up by lack of food and equipment. Increased food production depends on more fertilizer. Fertilizer, in turn, depends upon more coal. All hands have concentrated on the problem of increased coal production and the monthly average has risen from 450,000 tons to 2,000,000 tons. The minimum monthly requirement of 3,000,000 tons is still a goal for the future.

The problems posed in reviving agriculture, fisheries, forestry, textile manufacture and other industries are too numerous to mention here. Similarly, Eighth Army involvement in price control and rationing and in labor problems is too complex to describe, but I will mention briefly the import-export program. Imports are classified in order of priority as follows:

(a) Those essential to prevent disease and unrest.

(b) Those essential to accomplish the occupation mission.

(c) Those essential to sustain a minimum economy.

To date, all imports have fallen under the first two categories. Principal imports have been food, cotton, salt and fertilizer; principal exports have been silk, tin, rubber, lead and tea. Shipping, warehousing and other handling of these materials have been major responsibilities of Eighth Army. Imported food, particularly, requires alert supervision by military government personnel down to the point where the family actually gets it.

Public Welfare

The post-war welfare problems of Japan have been basically the same as in any war-devastated country, resulting largely from shortages of food, clothing and housing and from major dislocations of populations and industries. These problems have been accented by the fact that, in the past, the government assumed little responsibility in welfare matters. The major problems of military government welfare workers have been surveys of conditions, education, organization of emergency relief programs, and, more lately, the supervision of the SCAP-inspired Daily Life Security Law—the first comprehensive welfare law in Japanese history. This law places the burden of responsibility on local government agencies and embraces assistance to the destitute, distribution of free food and clothing, care of the homeless, inspection of institutions, care of foreign nationals, and disaster planning. Because of the poverty of the country and the lack of trained workers, the effectiveness of the program cannot be judged by American standards, but remarkable progress has already been made.

Public Health

The public health program for Japan has required close supervision by Eighth Army. Our public health men have been

concerned with prevention of outbreaks of the more serious epidemic diseases; aiding, advising and instructing Japanese public health personnel; inspecting hospitals and health centers; collecting medical data and statistics; and supervision of veterinary affairs. Japanese health regulations, as supplemented by SCAP directives, are followed. A close watch is kept on conditions which might threaten the Occupation Forces. Among accomplishments to date are successful battles against a threatened national typhus epidemic last winter and spring, the vaccination of the whole nation to effectively stop a serious smallpox threat in 1946, and the localization of cholera brought in by repatriates to about 1,250 persons in the vicinity of repatriation ports. Programs for the control of venereal disease, gastro-intestinal disease and tuberculosis have been instituted. These, as well as nutritional surveys and a new system of narcotic control, are expected to be very valuable on a long range basis.

Civil Information and Education

Our two-phased educational program is of importance in achieving the objectives of the occupation and is one of the most difficult of accomplishment. Its first phase was negative but essential—to remove from the educational system those factors which inculcated and kept alive ultranationalism and militarism. Until the end of 1946 most of the time available to our education officers was devoted to checking compliance with this phase and aiding in the reorientation of confused educators just released from the detailed autocratic national control which had long since killed all initiative.

We have now embarked on the positive, long-range second phase which is designed to decentralize control and to aid in instilling concepts of representative government, international peace, the dignity of the individual, and fundamental human rights. The impact of the new ideas on the minds of Japanese educators has led to much confusion and misunderstanding and, often, to stubborn resistance by diehards.

The civil information program, until recently, has been planned, supervised and directed at the SCAP level. The press, radio and motion picture industries have all been utilized. The program has now been extended to the operating level and military government units in the field are involved. It is too early for me to report Eighth Army problems or results.

Repatriation

At the close of the war there were about 6,600,000 displaced Japanese to be returned to Japan. In addition, there were some 1,200,000 Koreans, Ryukyuans and Chinese, many of whom had been brought to Japanese areas as slave laborers, to be returned to their homelands. The repatriation program was undertaken in October 1945 and the bulk of it completed by the end of 1946. The majority of Japanese yet to be repatriated are in Russia or Russian-controlled territory.

The program is operated by the Japanese under the supervision and control of the Eighth Army. At the height of operations, ten repatriation centers were functioning, some of them processing as many as 10,000 individuals a day. Repatriation has generally run smoothly. However, there have been difficulties. The most important were arrivals of cholera-infested ships from endemic areas of China and Korea. For a time all passengers from these areas were held in quarantine until a period of fourteen days had passed since the last outbreak of cholera aboard. At times as many as seventy-five ships with over 100,000 persons aboard were under quarantine at once. Great credit is due the American and Japanese health authorities at the ports who perfected and executed the procedures that saved Japan from an

outbreak of cholera similar to those which occurred in other parts of Asia. The smooth coordination between the Eighth Army port staffs and the Japanese complements is a fine example of the occupation at its best.

Legal and Government Matters

Until February 1946 the general body of international case law of belligerent occupation governed in Japan without comprehensive implementation by SCAP. At no time have the Japanese courts and police system ceased functioning in relation to the Japanese population; the basic responsibility for the maintenance of law and order among the civil populace has remained in their hands subject, of course, to whatever restrictions SCAP might choose to impose.

In February, the first of a series of directives was issued which formulated the present system of legal jurisdiction. A system of Military Occupation Courts (provost courts and military commissions) was created to provide a means of trial of offenses against the Occupation Forces and occupation objectives and to remove United Nations nationals from the jurisdiction of the Japanese courts except in special cases. The Japanese government issued an Imperial Ordinance which made all acts prejudicial to the objectives of the occupation and all violations of occupation directives crimes under Japanese law. Such acts may now be tried either in the Military Occupation Courts or Japanese courts at the discretion of occupation authorities. The Military Occupation Courts have served well to bridge the gap between the reasonable spheres of authority of the Japanese courts and the courts martial systems of the occupying nations.

The Eighth Army has been given the task of operating the occupation courts except in restricted areas under the control of General MacArthur's air and naval commanders. At present our provost courts handle about 1,400 cases a month, the great bulk of which involve illegal possession of occupation property. The number of cases involving major crimes has been very small.

Procurement

One of the most time-consuming tasks of our military government has been procurement from Japanese sources. Japan is expected to supply the essential needs of the Occupation Forces to the extent that this can be done without causing undue hardship among the people. The items procured cover a wide variety of supplies, real estate, construction and services. The major part of these are engineer construction materials, household furnishing, office furniture, utilities and maintenance service.

The Eighth Army military government echelon acts as the agency for procurement from Japanese sources. Strict controls have been established to reduce to a minimum, or prevent entirely, procurement of items critical to the Japanese economy, such as food, clothing, and certain basic raw materials. All items are obtained by making procurement demands on the Japanese government.

The program has involved a vast effort of planning, drawing up specifications, teaching prospective producers, supervising manufacture, inspecting products and expediting production. All details of procurement are generally handled by the Military Government Section, Eighth Army Headquarters. Standardized designs, careful consideration of Japanese methods and capabilities, and large scale contracts have resulted in major savings in terms of time, effort and quality.

Summary

I have presented a general description of Eighth Army's role in the military government of Japan. It is important to remember that the Army exercises no direct military government function. The

Supreme Commander imposes such prescriptions or restrictions on the central Japanese government as he desires. In general, it is the task of Eighth Army to see that the Japanese nation carries out the Supreme Commander's desires and to keep him informed of conditions in the field. The terms surveillance, observe, report, investigate—so often used in this article—may mislead the reader to believe that the Eighth Army function is negative. This is far from the truth. Assigned missions demand that all echelons of our military government assume a positive constructive role. The military government units in the field are the strongest point of contact of the occupation with the Japanese people. The interpretation of SCAP desires, the practical education in democratic methods, and the local leadership that these units have furnished the Japanese people and lower governmental agencies have had far-reaching effects upon the success of the occupation. Upon them to a great degree will depend the success or failure of our mission of teaching the Japanese people democracy as we understand it.

Our nation is faced today with problems, present and future, which equal in scope and significance any it has hitherto met in 171 years of existence. Because we are close to them, it is difficult to recognize their historical import. But grave they are, almost beyond precedent, and they deal—as did our great crises of the past—with the freedom of man. What America does today, what America plans for tomorrow, can decide the sort of world the generations after us will possess—whether it shall be governed by justice or enslaved by force.

* * *

The American process of government—everything for which our people have fought and will if necessary fight again—gives a potential enemy, through the transparency of our processes, great advantages. It gives him full notice of our defensive intentions and the assurance that we will not—that we cannot—secretly plot an aggressive war. The bulk of his intelligence information is available in the public press and in the open debates and decisions of the United States Government. There is no way except through genuine preparedness by which we can convince a possible aggressor that he can choose war only at the cost of his own exhaustion or destruction. Bluff on our part is impossible; preparedness must be actual.

General of the Army Dwight D. Eisenhower

Testing Equipment in Task Force 'Furnace'

The Information Section, Headquarters, Army Ground Forces

ALTHOUGH the final reports and tabulations of the summer tests of equipment conducted by AGF Task Force Furnace in the Great American Desert near Yuma, Arizona, have not been completed, those who participated in the gruelling try-outs on the rough desert terrain in the sand and heat have a clear cut conception of what the reports will reveal. The concensus is that, with few exceptions, the tested items held up remarkably well.

One hundred different items were on the Furnace testing agenda. They ranged from insignificant plastic spoons to a gargantuan "dragon wagon" (vehicle recovery truck). They included Ordnance, Quartermaster, Engineer, Signal Corps, Chemical Corps, Infantry and Armored equipment. Some of the test items were entirely new developments receiving their initial field try-outs. Some were items that had undergone tests under climatic and terrain conditions diametrically opposed to the hot, dry, sun-soaked sand, rocks and dunes of the desert, during winter tests at Task Forces "Frigid," "Williwaw" and "Frost" last winter.

A few of the items had been previously subjected to similar desert tests in 1942 and 1943 when Infantry and Armored divisions were being trained for overseas service in the Army's Desert Training Center, but which were modified in light of combat experience and, therefore, required retesting.

Staff work and other preparatory activities were started for the desert operation upon the completion of the winter tests in Camp McCoy and Alaska last winter.

Plans called for the participation of three AGF Boards: Board No. 1, Fort Bragg, North Carolina, working primarily with artillery and airborne items; Board No. 2, Fort Knox, Kentucky, dealing with motorized gun carriages, tanks and other tracked vehicles, and related items including weapons; and Board No. 3, Fort Benning, Georgia, testing infantry items, many of which pertained to the personal comfort and well being of the individual soldier.

Actual work of setting up the camp site and putting things in readiness for the summer tests were started in May.

Under the direction of Lt. Colonel Walter B. Richardson, commanding officer of Task Force Furnace, a tent city, adequate to house approximately 300 officers and men, was erected on an abandoned air strip in the heart of the desert about thirty miles from Yuma, Arizona, the nearest town. The surrounding terrain was ideally suited and contained ample space for the type of tests contemplated. Parts of it were flat sandy areas, but most of it was rough, rocky stretches of mountains and valleys, furnishing a variety of ground for laying out the courses over which tanks and other motorized vehicles were to be tested.

Up until the final two weeks of opera-

tion, there was no rainfall. Daily temperatures averaged 110° Fahrenheit, although peaks of more than 120° were registered.

Testing got under way in early June. From then until the middle of August the test items were put through their daily grind until, under gruelling and relentless use, they either proved their mettle or failed to make the grade.

Many of the new items intended for the personal use of the individual soldier were designed along radically changed lines and often employed new materials. Conspicuous because of its unusual design was a new type sun helmet that was tested by the members of the Task Force. Officially called the air-flow helmet, it was more frequently termed the "bed pan" hat or the "coolie sombrero" by its wearers. Considerably larger than the conventional type of sun helmet, it is designed to set well up from the head and to direct air into its interior to bring about cooling of the head.

A similar cooling effect for the other extreme of the soldier's body was provided by the tropical combat boots. The top of the boot was made of canvas to allow air to filter into the interior of the shoe.

Much talked about, but not particularly popular, were the newly devised nylon work or fatigue suits. While they are extremely light in weight and easily laundered, the suits proved to have the disadvantage of feeling "rubberized" and stiff when they become wet with perspiration. Most soldiers preferred to wear standard herringbone twill fatigue suits when working in the desert.

An M-18 on a test run in the desert. (Signal Corps photo.)

The more dramatic tests and the toughest ones on both equipment and men alike involved the use of tanks and other heavy motorized units. Week after week, during the hottest hours of the day, tank crews raced their vehicles over the burning sands. Under the careful observation of technical observers and the crew members themselves, deficiencies in operation and design of the vehicles were detected, and where possible, corrected on the spot. Elaborate check sheets were filled out after each test to determine the operating

efficiency of each vehicle. In general, reports showed that the tanks and various other tracked motorized units now used by the Army function satisfactorily in the desert.

The Task Force got gratifying results with the Cooling Efficiency Tests conducted on the M-26 medium tank. The performance of the vehicle in these tests indicated that satisfactory operation could be expected in hot-dry climates, with air temperatures not exceeding 130°. During its test trials, the tank attained a maximum operating temperature of 235° in the torque converter, which is well under the safe operating limit of 275°.

In some tests, however, a few difficulties were encountered. In working with the M-24 Light Tank, the test group found that the engine operating temperature was critically high during phases of operation with hatches closed, three engine failures occurred in rapid succession with different vehicles. These failures, it was determined, were the direct result of over-heating. Following experiments with various field expedients, under the supervision of engineers from industry and technical services, a marked reduction in the engine operating temperature was accomplished by rerouting the transmission cooling line. While this modification resulted in definite improvement, it is believed that a redesign of the cooling system of the M-24 will be necessary to make the vehicle completely satisfactory for desert operation. Already engineering studies and test have been initiated to correct this deficiency.

Many of the tests undertaken during the summer served as comforts and conveniences to the troops while the items were under test. Prominent among these was the portable ice cream plant, the testing of which required the eating of a generous helping of ice cream each day by every member of the Task Force. Including those occasions when the plant operated while bouncing over the desert in the back of a truck, the test was a great success, as far as the troops were concerned.

The portable squad shelter was tested as both living quarters and office space. Shortly after the beginning of these tests, one of the first of many "twisters" attacked the camp, and the miniature tornado lifted and threw the shelter about

Tankmen measure the heat of synthetic rubber track blocks after a test run. (Signal Corps photo.)

thirty feet from its original position and dropped it in a jumbled heap. Iron stakes were then attached to the portable shelters and driven deep in the ground, which corrected this deficiency.

Several comparison tests were made with the standard Lyster bag now in use by the army, and a new porous type canvas water bag. The tests showed that the newer bag, cooling the water by means of evaporation through the porous canvas, maintained temperatures ten to fifteen degrees cooler than the standard bag.

Two test items running along the lines of personal cleanliness proved to be quite successful. Three mobile field bath units, each equipped with twenty-four showerheads, were used throughout the summer desert tour. Prior to the completion of the Task Force pipe line, these showers

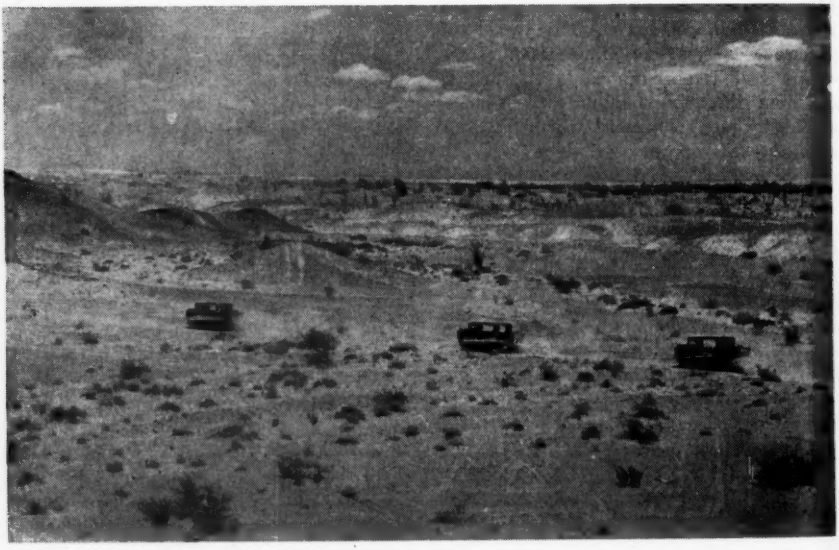
were fed by 700 gallon tanks, which in turn were kept full by de-con trucks. The showers, a great treat to the perspiring, sand-caked troops after a hot day in the desert, never once failed to function, weathering wind and dust storms, and, during the final week of testing, a terrific rain storm.

Also popular was the two-trailer type mobile laundry unit, which does not depend upon trained personnel for its successful operation. The unit was capable of turning out clean laundry for the entire complement of 300 officers and men, every two days. With water being supplied by the six mile pipe line, the gasoline operated unit was equipped with both washing and drying units.

Food, and its related items, was the subject of many tests of the Task Force. The problem of keeping meat, fresh, fruits and other perishable items protected from the desert sun was solved by the use of several portable refrigerator units. Two different types, the fifty cubic foot reach-in type, and the twenty-five cubic foot chest type saw service during the testing period. Both type units achieved considerable success.

Taking food to test groups operating in the desert considerable distances from the base camp, and keeping it hot or cold, brought into service the modified insulated food container. Consisting of three metal containers cased in an insulated metal box, the containers succeeded in keeping the food at near the same temperature registered when put in the case. While these tests were successful, the containers were more popular when used for carrying ice water. Easily transported from place to place and capable of keeping water cold from four to six hours, test groups seldom left the camp area without one of the convenient units.

Development items of individual mess



"Weasels" on a desert test run. (Signal Corps photo.)

equipment presented three interesting tests. Plastic mess trays, similar in design to the metal trays now employed throughout the army, were tried out. The chief difference between the two trays, aside from the material they were made of, was the deeper individual compartments in the plastic model. This prevented appetizing five course meals from becoming stew in the process of carrying the tray from serving line to mess tent.

A compact knife-fork and spoon combination was given a week's trial. They are individual utensils, but while not in use they may be fitted together into a neat single unit, thus preventing excess rattling in the mess gear and reducing the possibility of loss.

Target for much comment, ranging from praise to ridicule, was the plastic spoon. Powder blue in color and considerably smaller than the regulation spoon, the utensil was found suitable for eating ice cream, but proved unwieldy in tackling canteloupe or watermelon, due chiefly to the insufficient leverage afforded by the short handle. The utensil was referred to as the "Humpty-Dumpty" spoon.

All of the results of the extensive tests made with numerous weapons, ammunition, and chemical equipment, are as yet unobtainable. Thousands of rounds of ammunition were fired from a variety of weapons, ranging from the M-1 rifle to the 105-mm Howitzer. Modifications of the various weapons, such as a lightweight mount for the .30 caliber machine gun and sniperscopes for rifles and other small arms, were tested with varying degrees of success.

Chemical equipment also had its place in the Furnace activities. Many different items including incendiary shells, illuminating shells, hand and riot grenades, and floating smoke pots were on trial during the summer. Three types of service and combat gas masks, plus permeable and impermeable protective clothing also were under careful observation.

Final conclusions and decisions concerning the merit of the data collected at Furnace will be made when the final reports are written and reviewed. However, the 300 officers and men, augmented by engineers and technicians from various services, that made the tests and saw new knowledge concerning Ground Forces equipment unfold each day, left the desert at the summer's end convinced, on the whole, that a good job had been done, and that Task Force Furnace had compiled much information that would prove valuable to the Army Ground Forces in the future.

We could not fight World War II with the weapons or the methods of World War I and we cannot safely prepare for another war with the idea that our planes or ships or armaments must follow any traditional pattern.

Secretary of Army Kenneth C. Royall

'Operation Cloudburst'

Lieutenant Colonel E. A. Salet, *Infantry*
Instructor, Command and General Staff College

Colonel Salet presents, in this imaginary account of a military operation of the future, some of the many problems which future commanders may encounter in warfare involving vast distances, air transportation of armies, long-range missions, and fighting in Polar regions.—The Editors.

THE following account of Operation Cloudburst is based on notes from the personal diary of Lieutenant General Jet Turbo, Commanding General, III Corps (Airtransported). The diary was first published in 1962, on the second anniversary of this memorable operation. That portion of the operation executed by III Corps (Airtransported) is emphasized in this particular account.

Preface by Author

The years 1959-1960 will always be remembered by Americans as marking one of the greatest crises in our history as a nation. It was during this period that the Labonnite hordes overran the whole of Europe and Eurasia, secured the Mediterranean Coast of North Africa, and strangled the British Isles in the process.

Coincident with the downfall of our European friends, the Labonnites succeeded, during September of 1960, in establishing a base in the state of Alaska in the immediate vicinity of Fairbanks.

With one foot in the door, the Labonnites, being predominantly a land power, worked feverishly during the next month to develop their Alaskan base in preparation for an all-out land and air campaign against Canada and the United States.

During the month of October 1960, the ominous rumble of guided missiles came out of the north. These attacks, the first of a planned "softening up" process, fell over the cities of Detroit, Pontiac, Chicago, Cleveland, Buffalo, and New York. These initial attacks, while creating consternation among the populace in the target areas, inflicted negligible damage on the industrial heart of America. This was due primarily to the inability of the Labonnite missiliers to pinpoint their targets.

To retrace our steps for a moment, we find that the United States had not been idle during the rush of the Labonnite tidal wave over Europe in 1959. The Labonnites, banking on our usual lethargy in matters of this kind, were not prepared for the violent reaction their overt acts caused in this country. In November of 1959, the Congress declared a total mobilization of our industrial and manpower might. The First Airborne Army, born and nurtured through our farsighted universal military training program, was mobilized, and by the Spring of 1960 was ready for sustained operations. This force was composed of two corps of four divisions each. The II Corps (Abn) was composed of four airborne divisions; the 81st, 82d, 83d and 84th. The III Corps (Airtransported) was composed of four

infantry divisions trained in airlanded and arctic operations; the 1st, 2d, 3d and 4th Infantry Divisions. As of 1 March 1960, all units of the First Airborne Army were located as follows: II Corps (Abn) in Minnesota and Michigan; III Corps (Airtransported) in Montana and North Dakota. Both Corps had just completed extensive winter maneuvers under conditions of extreme cold.

From the foregoing brief account, it is evident that immediate and decisive action was required on the part of the United States if the Labonnite lodgement area in the state of Alaska, and the guided missile sites therein, were to be eliminated before the Labonnites were so firmly entrenched that Canada and the industrial heart of the United States were placed in acute jeopardy.

How this was accomplished is well illustrated in the following pertinent excerpts from General Turbo's diary.

15 September 1960. Have just returned to my headquarters from a lengthy conference in Washington. The conference was conducted by the Secretary of Defense, the Honorable A. N. Nairmy. Those attending were General Doughy, Army Chief of Staff; General Fuslage, Chief of Staff, Air Forces; the Honorable J. W. Armour, Secretary of the Army; the Honorable D. S. Cruisy, Secretary of the Navy; the Honorable L. M. Propulsor, Secretary of Air; General Wingie, Commanding General, Air Defense Command; General Boeing, Commanding General, First Airborne Army; General Glichute, Commanding General, II Corps (Abn); General Carrgo, Commanding General, VI Air Force (Troop Carrier); General Airrlon, Commanding General, Strategic Air Command; General Getto, Commanding General, 1st Tactical Air Force; and their principal staff officers.

Admiral Holmes, Director, Central Intelligence Group, reviewed the present world wide situation and pointed out that with open revolts spreading throughout Europe and Eurasia the Labonnites were being forced to keep fifty per cent of their combat strength tied up in occupation duty alone; and that another twenty-five per cent were dispersed along vulnerable coastline areas against a possible amphibious threat by the United States. As yet the Labonnites have not moved against China and India. They are evidently finding that their logistical problems are becoming increasingly complicated. Mr. Nairmy informed the conference that the First Airborne Army would be employed against the Labonnites in their Alaskan lodgement area. General Boeing was instructed to prepare plans and submit rec-

ommendations by 15 October for the employment of his command to cover the following:

1. Seize by airborne assault an airhead in the present Labonnite lodgement area.
2. Destroy the guided missile sites therein and cover the airlanding of the remainder of the First Airborne Army.
3. Upon airlanding of the remainder of his command, assume the offensive and destroy the Labonnite forces in the Fairbanks area.
4. Be prepared to maintain his command completely by air. General Doughy assured General Boeing that sufficient service troops to furnish necessary logistical

support would be attached to the First Airborne Army no later than D—30.

17 September 1960. Upon instructions from General Boeing, have moved my planning staff to Minnesota where a joint planning group has been established. This appears to be a good plan and will resolve many problems of liaison and coordination. VI Air Force (Troop Carrier), Strategic Air Command and 1st Tactical Air Force (which will support First Airborne Army) are also represented in the planning group.

18 September 1960. Detroit received another guided missile attack today. Considerable damage was done to the business district. The Labonnites undoubtedly are "gunning" for the Ford Rouge River works but have been unsuccessful to date. Our antiaircraft "homing" projectiles have brought down a number of the guided missiles, but too many are getting through. The Navy reported the sinking of one of the Labonnite's super submarines off the coast of New England. The submarine was caught on the surface in the act of launching a guided missile attack on New York.

20 September 1960. Buffalo received a particularly heavy guided missile attack this morning. Several direct hits were registered on the Bethlehem Steel plant causing considerable damage; especially to the blast furnace rooms.

Talked to Airrlon (Strategic Air Command) regarding strikes by our "heavies" on the Labonnite guided missile installations. As yet no apparent damage has been done. Evidently they are too well camouflaged for accurate identification, or else they have been rendered completely bombproof. However, our air strikes have been causing the enemy considerable difficulty in maintaining his supply routes (air, rivers and land) from the north.

25 September 1960. Received a thorough briefing on weather conditions in the objective area during conference at Headquarters First Airborne Army today. In this particular operation, weather will be our greatest enemy. The problem of visibility in the Arctic is extremely complex. The air is very transparent, and the records are replete with accounts of the extremes of visibility. Limitations to visibility in Arctic regions are primarily fogs, blowing snow, and local smoke. Local smoke is serious only in the vicinity of the larger towns. Blowing snow constitutes quite a hazard to flying at certain times of the year, and coupled with high winds, all traffic becomes impossible. An analysis of winter conditions in our objective area for the period 1954-1959 indicates that when the temperature falls to —45° F or lower, the visibility will be very poor. When the temperature rises above the freezing point in winter, the visibility will be very good. In analyzing fog conditions in the objective area, the sprinng and summer months offer the least number of foggy days, but of course, ground conditions are such during this period that land operations would be extremely difficult due to the "boggy" condition of the earth. A complete analysis of weather conditions for each month indicates that the winter months offer the best combination of temperature, visibility, least precipitation, and snowfall. Of the winter months, November and December appear to be the best months for us to initiate our operations. With ground conditions extremely poor during the summer, the enemy has had to depend primarily upon airtransport and river traffic for maintenance of his base. Our definite air superiority has made this very costly for him. Therefore, we must strike as early as possible during the winter months before the enemy can increase his build-up by his overland routes.

28 September 1960. New York City and Washington both received heavy guided missile attacks last night. The waterfront section of New York received several direct hits, while in Washington the Senate

Office Building was almost completely destroyed. Fortunately the building was almost empty at the time or we would have suffered severe losses among our legislators.

29 September 1960. Our Strategic Air Command laid on their heaviest raid to date in the Labonnite lodgement area. Heavy flak was encountered, but results were good. For the first time our own mobile guided missile batteries on the Canadian border went into action in a counterbattery action against the enemy installations. Photographs taken from our robot piloted, radio controlled reconnaissance plane revealed no direct hits on the Labonnite installations, but when our missiliers get "ranged in" we can expect better results.

4 October 1960. No guided missile attacks for three days. Our bomber strikes have definitely slowed down the enemy in this respect. He is also definitely short in long range fighter aircraft, as witness the total lack of heavy bomber attacks against us to date.

10 October 1960. General Boeing outlined the First Airborne Army plan today to Glichute (CG II Corps Abn) and myself. Generals Carrgo, Airrlon, and Getto were also present. The plan in brief is as follows:

1. To have II Corps (Abn) landing by parachute, beginning at H-hour, D-day, destroy the guided missile sites now in operation, seize the four air fields in the Labonnite lodgement area, establish an airhead and protect the airlanding of III Corps (Airtransported).

2. To have III Corps (Airtransported) upon arrival in the airhead, advance rapidly and destroy the Labonnite lines of communications from the north and liquidate the remainder of the enemy forces now in that portion of the state of Alaska.

3. To have all units of First Airborne Army transported by VI Air Force (Troop Carrier) and all close air support furnished by First Tactical Air Force.

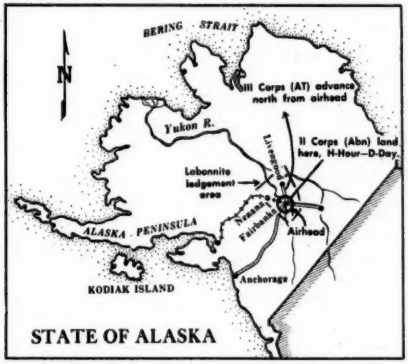
4. To have the complete force closed in the objective area by D+6.

5. To have D-day tentatively set for 16 November.

6. The code name of the operation will be *Cloudburst.*

G-2, First Airborne Army, briefed us on the enemy situation within the airhead essentially as follows:

1. Enemy ground forces in the Alaskan lodgement area comprise four infantry (Arctic) divisions, each at a strength of approximately 15,000 men. These divisions are reinforced by antiaircraft artillery



units, air force units, and miscellaneous service units.

2. There are at least two guided missile installations in the vicinity of Fairbanks operating now, with completion of two more sites possible by December. There are also at least two mobile units in operation. (This probably accounts for our inability to silence these attacks by our bomber raids.)

3. Enemy air in the lodgement area cannot prevent a large scale airborne effort on our part. Labonnite fighter aircraft are definitely inferior to ours both in range and design. At present the enemy has an estimated two groups of 200 fighters each in the Fairbanks area.

4. There is no indication that the Labonnites will not continue to observe the United Nations agreement, reached in 1952, outlawing the use of atomic bombs, other radio active materials, and biological warfare.

5. With their present troop commitments throughout Europe, Eurasia, and North Africa, and attendant logistical difficulties, added to the fact that the Arctic area will not sustain ground movement until winter, the Labonnites cannot increase their build-up of troops in the lodgement area sufficiently for an all-out land offensive against Canada and the United States any earlier than February of 1961.

It has been concluded that the Cloudburst force would have adequate security against enemy ground forces; and that once established in the area, the enemy lines of communication, both land and air, can be completely severed. General Carrgo pointed out that unless the enemy flak was neutralized the effect might be disastrous to our aircraft. General Airlon said that enemy flak could be reduced by two-thirds by D-day. He also assured us of overwhelming fighter protection. General Carrgo also warned against air congestion in the objective area. To avoid this, flights will have to be carefully spaced, and effective ground control established. The plan also envisages construction of five additional landing grounds by four battalions of aviation engineers (airborne). The completion of these fields within five days (as envisaged) will depend on the amount of damage done to the four existing fields now in the area. General Boeing pointed out that the plan was logistically feasible, but that several conditions must be accepted, namely:

1. That no alternate lines of communication to the objective area will be available. Since the Labonnites have succeeded in cutting the one railroad into Anchorage and since the Alcan Highway into Fairbanks is completely unreliable being blocked by snow and land slides much of the time, we will have to depend on aerial resupply alone for the support of the Cloudburst force.

2. We will be relying on an administrative organization as yet untried on such a scale.

After discussing other aspects of the operation the conference was adjourned until tomorrow.

11 October 1960. Conference continued at Army Headquarters. Commanding General, VI Air Force (Troop Carrier) announced that the C-199 would be used exclusively for transport of both parachute and airlanded echelons, and for all aerial resupply missions. This aircraft is capable of flying a 50,000-pound payload a distance of 6,000 miles. I questioned the ability of destination fields to handle aircraft of this size, but was assured that all four fields in the objective area were capable of handling the C-199. New principles of jet-retardation and track landing gear construction have made it possible to land an aircraft of this size on almost any type of field. The CG-116 Glider has been designated to fulfill all glider requirements. The operation will be mounted from departure fields in Montana, North Dakota, Minnesota, and Michigan. Considerable dispersion is necessary. A guided missile attack against "All our eggs in one basket" would be catastrophic.

16 October, 1960. Held a conference with my planning group today. Several problems have arisen between III Corps and VI Air Force (Troop Carrier) as to responsibility for planning. Informed my G-3 that we are responsible for the following in *our* planning:

1. Movement of troops, equipment and supplies to departure fields.

2. Control of troops while at the departure fields.

3. Loading of all troops, equipment and supplies.

4. Unloading at the objective area and proper evacuation of the destination fields.

5. Assembly and regaining of command control at the objective area.

6. Proper employment of the command to accomplish our assigned missions.

I added that I was certain the VI Air Force (Troop Carrier) understood their responsibilities to be essentially as follows:

1. Make available to us at departure bases, the facilities for the air movement.

2. Assist in loading.

3. Safely deposit all troops in the objective area.

4. Assist in clearing of landing fields of all troops, supplies and equipment.

I reiterated to my staff that in order to prevent duplication, delay, and misunderstanding we must understand our planning responsibilities, and respect the prerogatives of the planning groups of associated units, both air and ground.

21 October 1960. Inspected training exercises in 3d Division area today. All units seem to be fit and morale is high. Was particularly interested in several schools where company grade officers and noncommissioned officers were receiving additional instruction in the following:

1. Computation of safe loads.
2. Lashing of equipment.
3. Use of safety devices.
4. Practical work in loading and unloading of equipment.

Regimental staff officers were checking general capacities of several type aircraft, flight stability of these aircraft, and becoming familiar with proper usage of flight forms.

23 October 1960. Held a conference with my own planning staff at which Tracgear (Corps G-3) briefed all concerned on progress of planning for "Cloudburst." We will need approximately 1,100 C-199s to move the personnel and equipment of the four infantry divisions and 300 to move that of the corps troops in one lift. Tracgear pointed out that we will have 1,000 C-199s available to us for movement of the entire corps. This means that we cannot move the entire corps into the objective area in one day, although the air fields there could handle the traffic (each of the four fields can accommodate 500 C-199s per day). Consequently, I checked Tracgear's priority of movement table very carefully and found it satisfactory. We will land three infantry divisions and a portion of corps troops on the first day and complete the move by "turn around aircraft" on the second day. We are using no gliders except fifteen CG-116 Gliders which will be utilized to send in advance parties of key units on D+1 or D+2. I questioned Tracgear closely on contemplated methods of regaining command control at the destination fields. The plan is essentially as follows:

1. Insure, through coordination with the VI Air Force (Troop Carrier) on landing plans, that the integrity of tactical units is preserved in flight and on landing to the greatest extent possible.

2. Require submission to Corps of the landing and unloading plans to be used at destination airports.

3. Insure control of troops and rapid clearing of landing fields within the airhead by sending forward on D+1 or D+2 a control party consisting of an officer and a sufficient number of assistants for each of the four airports upon which the corps is to be landed. This control officer will establish a small command post on each airport. This command post will also serve as a report center to which personnel may report for information concerning any phase of the assembly. The control officer will work in conjunction with the air control officer present at the destination air fields, and will be responsible for the following:

a. Rapid and orderly unloading of all planes, and the prompt clearing of the field of men, equipment and supplies.

b. Posting of guides to the assembly

area. (Divisional assembly areas to be assigned by corps.)

4. Each division headquarters will send forward by glider on D+1 or D+2 an assault command post echelon with sufficient personnel to have the command post in operational order upon arrival of the bulk of the division.

I emphasized that all troops should be made thoroughly familiar upon enplaning with assembly areas, markings to be used to identify the area, the common challenge and countersign designated for the operation, and any other details that might be utilized to facilitate quick resumption of command control.

24 October 1960. Visited 1st Infantry Division today. New equipment, particularly clothing for Arctic conditions, is arriving and it looks good. The insulated, electrically heated suits for individual wear will reduce considerably the bulk of clothing heretofore needed. The new insulated "F" ration containers have solved the problem of food freezing before it can be eaten. Was particularly interested in the electrically heated sleeping bags and new type tentage. Both of these will aid considerably in protecting casualties from the extreme cold.

25 October 1960. Observed the 2d Division's tank battalion in a training exercise. They are now equipped with the new thirty ton Arctic tank. The tank is completely insulated, and the temperature inside can be adjusted to counteract temperatures as low as −80° F. The carbon monoxide hazard has been reduced by the use of a secret chemical agent that combines with carbon monoxide and renders it harmless.

26 October 1960. Bombers of the Strategic Air Command carried on extensive raids over the Fairbanks area yesterday. Direct hits were observed on several enemy supply areas. Flak encountered ranged from moderate to light. Enemy fighters were not very effective. It appears the Labonnites may be stretching their available fighter strength quite thinly.

27 October 1960. Our bomber attacks have not silenced the enemy's guided missile installations. Detroit received a particularly severe attack this afternoon. Considerable damage has been reported. Our intelligence is satisfied that at least two of the Labonnite missile launching establishments are mobile. Direct hits by our bombers have been made in locations reported through radar location sets, but the missile attacks continue unabated.

28 October 1960. Have just returned from a busy day at Washington. First Airborne Army's plan for Cloudburst has been approved, and D-day has been changed to 3 December. Our weather experts feel that November might find ground conditions still unsatisfactory in the event of a delayed freeze. Our engineers are also planning on frozen ground to furnish the foundation for the additional air strips they are constructing. General Airrlon (Strategic Air Command) has assured General Boeing that continuous demolition bombing operations will be conducted up to the last possible moment before H-hour. Particular emphasis will be placed on reducing the enemy antiaircraft installations in the objective area. II Corps (Abn) plan calls for all four fields in the objective area to be captured by D+3. III Corps (Airtransported) will initiate airtransported operations on D+3 if fields are seized intact; or as soon thereafter as possible. The aviation engineer battalions will go in by glider on D+1 and D+2 with II Corps (Abn). The four infantry divisions of III Corps will marshal in departure fields 1 to 12. Conferred with Glichute (CG II Corps Abn) and agreed to land all corps artillery units early. Instructed my G-3 to revise his priority table accordingly.

14 November 1960. Have spent the last two weeks inspecting all III Corps units. The troops are in excellent condition and

their morale is high. Observed training exercises of II Corps (Abn) units. These troops are superb and in a "fighting mood" also.

16 November 1960. Detroit, Cleveland, Buffalo, and Chicago were hit simultaneously at 1400 today. Its high time Cloudburst was on the way. The enemy missiliers are becoming more accurate, and Detroit in particular suffered severe damage. The General Motors assembly plant was completely demolished. We cannot afford much of this sort of treatment. Toronto, Ottawa, and Quebec also received quite a "pasting." Our guided missile units are retaliating, but finding isolated targets is much more difficult than hitting large cities.

23 November 1960. Seattle took the brunt of the enemy's guided missile attack today. Our bomber attacks have slowed up the enemy, but as yet they have been unable to silence him. Our intelligence agencies have definitely established four guided missile sites as being in operation now in the Fairbanks area, of which two are definitely mobile. A refugee Eskimo picked up by patrols of the First Canadian Army has reported considerable enemy activity in the vicinity of Fort Yukon. He believes that the enemy is constructing another "big boom place" there. A report was received at 1600 that a formation of fifty enemy bombers attacked Duluth at 1530. This is the first bomber attack attempted by the enemy. Results were negligible and twenty of the enemy aircraft were shot down.

28 November 1960. All plans are completely "buttoned up" and units are marshalling at their respective air fields. Strategic Air Command is on a "round the clock" bombing schedule. Numerous direct hits in enemy flak installations have been observed. Our troops are glad to be getting into action.

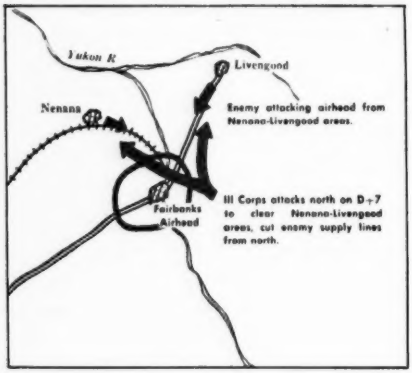
3 December 1960, D-day, Operation Cloudburst. Went to departure fields L, M, and O to witness the departure of the 81st, 82d, and 83d Airborne Divisions. Upon their departure I took off in my own plane to witness the landing. The C-199s converged at assembly points over Canada and then split into two trains for the approach to the objective area. Both columns reached their objectives on schedule. Our air support was magnificent. The bombing plan was executed as follows: First, 1,000 radio controlled flying bombs were sent over the area to reduce enemy antiaircraft installations. This is the first time these flying bombs have been used in mass. Many were exploded in the air over the objective area by the enemy's "homing" antiaircraft projectiles, but their total effect on the antiaircraft emplacements was disastrous. This attack was followed by a barrage of 20,000 guided missiles from our mobile guided missile units. The guided missile attacks were followed by 2,000 bombers which concentrated on the enemy's troop installations and guided missile sites. The C-199 columns were protected by 1,000 Mercury jet propelled fighters from the 1st Tactical Air Force. Complete surprise was achieved, and by darkness of D-day, the two mobile guided missile installations were captured, as were two of the four air fields.

D+1, 4 December 1960. Bitter fighting is raging in the objective area. The enemy is clinging tenaciously to the remaining two air fields and as yet II Corps has been unable to pierce the defenses surrounding the two fixed guided missile sites. Two battalions of engineers have landed in the objective area and are working feverishly to place the fields in operational condition as soon as possible. II Corps is in dire need of medium artillery and armor. Our air is in complete command of the skies and can keep the enemy's artillery fairly quiet during daylight hours.

D+2, 5 December 1960. II Corps has reported the capture of the third air field. Through our initial air attacks destroyed

many of the enemy, he has brought in two divisions from the Nenana area and is counterattacking in strength. II Corps casualties are mounting steadily as a result. Have sent in our advance parties by gliders this morning. They consisted of air field control parties, advance command post echelon, tactical air direction center, and a forward command post echelon from each of the four infantry divisions. II Corps reports two fields will be operational by tomorrow morning. Will initiate airtransported operations immediately.

D+3, 6 December 1960. Arrived in the objective area with first echelons of III


Yukon R
Livengood
Nenana
Enemy attacking airhead from Nenana-Livengood areas.
Fairbanks Airhead
III Corps attacks north on D+7 to clear Nenana-Livengood areas, cut enemy supply lines from north.

Corps units. We are bringing in all corps artillery and the organic tank battalions of the infantry divisions first. Destination fields are still receiving spasmodic long range artillery fire, but our operations are proceeding according to schedule. By dark tonight, we closed in the 1st and 2d Infantry Divisions on fields one and two. The control system set up at each field is functioning smoothly. Men, supplies, and equipment are being cleared from fields immediately upon landing. Our air field control parties are working in complete harmony with the air control officers present at each field. Corps artillery went into previously selected firing positions immediately and have fired a number of missions already in support of II Corps. The 84th Airborne Division is making an all out attack tomorrow morning on the last guided missile site. III Corps infantry division tanks will support the action. If necessary, 1st Infantry Division will be used to support the 84th. It is being attached to II Corps as of 1800 today.

The 81st Airborne Division completed the capture of the fourth air field by late afternoon today. The other two aviation engineer battalions closed by glider at 1700 yesterday. Our air has swept enemy aircraft from the skies. Weather conditions have remained favorable and aerial resupply missions are proceeding according to schedule. The third air field will be operating by tomorrow morning and, if the good weather holds, we will close in the 3d and 4th Infantry Divisions plus the remainder of corps troops by darkness of D+4.

D+4, 7 December 1960. The 84th Division launched its attack against the last guided missile site at daylight this morning. By noon they had pierced the enemy's defenses, but the going was slow. At 1300 today, General Glichute (CG II Corps) committed the 1st Infantry Division on the 84th's left, and by 1600 the combined assault of the two divisions succeeded in capturing the objective. The airhead perimeter is now completely established and extends roughly twenty-five by fifteen miles. Enemy attacks are continuing against the northern perimeter of the airhead. At 1800, 1st Infantry Division was released from attachment to II Corps (Abn) to attachment III Corps (Airtransported). By darkness today the 3d and 4th Infantry Divisions were closed into the airhead, as were 4,000 replacements for II Corps (Abn).

D+5, 8 December 1960. All four fields are now operational, and work is progressing on the five additional landing strips. Attending a conference at First

Airborne Army Headquarters in Fairbanks. General Boeing wanted to know when I would be ready to initiate operations against the enemy's lines of communications and particularly against his positions at Nenana and Livengood from which he is launching his attacks against the airhead. I informed him that operations could commence at once, inasmuch as we were completely closed in the airhead, but that I was worried about the supply situation. General Boeing informed me that the supply problem was well in hand and that 350 C-199s were being devoted daily to resupply alone. The II Corps will continue to hold the airhead with three divisions, while the fourth (the 82d) will be held as army reserve. Before the conference broke up, it was decided that III Corps would initiate its offensive on 10 December (D+7) to clear the Labonnites completely from the Fairbanks area.

D+6, 9 December 1960. The good weather is still holding. Held a staff conference with my division commanders and checked all plans for the offensive from the airhead. We will be dependent completely on air supply, but believe we can complete the operations against Nenana and Livengood by D+45. Our intelligence indicates the Labonnites are holding Nenana with one division reinforced and Livengood with two regiments reinforced. With the capture of these two bases we will have severed his lines of communications from the north and eliminated him completely from the Fairbanks area. Completely equipped as we are for Arctic warfare, and with our complete air superiority, we should experience no unsurmountable difficulties in the performance of this mission. The developments in aircraft and equipment since World War II has enabled us to transport all of our weapons and equipment intact. Our rear echelon no longer includes medium artillery, tanks and other vital pieces of equipment that must be reunited with parent units at a later date by sea or land transport.

Epilogue

The remainder of General Turbo's diary is concerned with the movements of his corps from D+7 until D+35 upon which date they completed the destruction of the Labonnite forces in Central Alaska. As General Turbo so forcibly points out. the problems confronting the commander of an airlanded infantry corps are no different than those confronting the commander of a normal infantry corps once they are on the ground. The airlanded corps simply utilizes a different mode of transportation. With the advent of aircraft, of the type used in Operation Cloudburst, the problems of transporting vital pieces of equipment such as heavy artillery, tanks, and prime movers have been solved. Troops are transported as units and, upon reaching the objective area, are capable of fighting as a team with all of their supporting weapons. Like the normal infantry corps commander, the airlanded corps commander influences the action by attainment of surprise, maintaining close contact with his divisions, by use of his corps artillery, by the employment of his corps reserve, and by coordinated air-ground action.

In marshalling for an air movement, the airlanded corps goes through essentially the same planning phases as would a corps being moved by sea, rail, or motor. They marshal at air fields instead of ports. They load in aircraft instead of ships. Both must have plans to regain command control at destination fields or ports. Their ground action is dictated by the same principles of warfare. Operation Cloudburst presented different problems of equipment, clothing, and training in that it was executed in Arctic regions, but the tactical principles remained the same.

In comparing the actions of the airborne corps commander and those of the

airlanded corps commander we find several striking contrasts in problems involved. Although the airborne corps commander has the same type of tools with which to work, they are less in quantity during the assault phase of the operation. He, too, influences the action of his corps by the same methods as described for the airlanded corps commander, but initially his artillery, antitank, and armored means are in much lesser quantity. His freedom of movement is generally much more restricted. The size of his corps reserve is generally limited due to restrictions imposed by availability of airlift and by the necessity of using the bulk of his forces over a wide front to secure the airhead.

Operation Cloudburst marked the first time that an air operation of this size and scope had ever been attempted. A new front was opened and maintained completely by air. It proved that such operations are entirely feasible, provided air superiority can be maintained; and that with movement over Arctic land masses so difficult and hazardous, airborne and airlanded troops provide the most successful means of Arctic warfare.

Such is the pattern of war in the 20th Century. If this nation is ever again at war, suffering, as Britain did in this war, the disastrous attacks of rocket-propelled weapons with explosive power like our own atomic bomb, it will bleed and suffer perhaps to the point of annihilation, unless we can move armies of men into the enemy's bases of operation and seize the sites from which he launches his attacks.

General of the Army George C. Marshall

For those who did not see our air forces in action, or the results of that action, it may be difficult to evaluate properly the significance of American superiority in the recent conflict with Germany and Japan—what it meant in terms of victory or defeat. But to those who know the true meaning and effectiveness of air power, it is clear that the future peace and security of the United States depends to a large degree upon the maintenance of American air strength and the continuous exploration of new air frontiers.

Lieutenant General James H. Doolittle

The atomic bomb has not greatly changed basic military principle nor has it obviated many of the conventional roles of military forces. Atomic attacks will be followed by invasions—probably airborne, particularly if over water, and counter invasions; the ensuing warfare will be orthodox in principle, but not in detail. All efforts of the military team will have for a goal the breaking of the enemy's will to resist and final advance of the ground troops into enemy soil. The qualities required for leadership both in combat and in the rear, will be far greater than in the past.

Major General Leslie R. Groves

The Dissolution of GHQ

and the

Establishment of Army Ground Forces

This article is Chapter X of a study on the "Origins of the Army Ground Forces General Headquarters, United States Army, 1940-1942," recently published in the first volume in the series "The United States Army in World War II," and the first in the subseries "The Army Ground Forces." It was written by Dr. Kent Roberts Greenfield and Dr. Robert R. Palmer. —The Editor.

GENERAL Leslie J. McNair's request in his memorandum of 25 July 1941, for the enlargement of the authority of GHQ, precipitated a long and critical discussion within the War Department, terminated only by the reorganization of 9 March 1942. In the light of the strategic situation confronting the United States, it was finally concluded that execution of the Harbord Board plan of 1921 was inadvisable. The training activities of GHQ were to be continued as a function of a new command, the Army Ground Forces, but its planning and operational responsibilities were transferred to agencies which received the powers never granted to GHQ.

Reform of GHQ versus Reorganization of the War Department

It was quickly seen that the proposals in General McNair's July memorandum would, if adopted, "affect both the peace and war activities of almost every agency of the War Department." On 14 August, General Marshall refused the issues raised to a board representing the five sections of the General Staff, the Chief of the Army Air Forces, and GHQ. Holding its first meeting on 14 and 15 August, this board concluded with only one opposing voice that "a major reorganization of the War Department was in order." Thereupon WPD (War Plans Division) drafted a study to implement this recommendation. It sketched an organization similar to that later put into effect in March 1942, in which GHQ was to be eliminated. But its study, which was to reappear in October, was soon withdrawn, and WPD proceeded with an effort to achieve a satisfactory redefinition of the "functions, responsibilities and authority" of GHQ. This effort, continued through September and October, was finally defeated by wide divergencies of opinion and interest. The two successive formulas which WPD put forward proposed too little authority for GHQ to satisfy that headquarters and too much to obtain the concurrence of G-4, G-1, and G-3 of the War Department or the Chief of the Army Air Forces. In November the proposal to reorganize the entire War Department was again given the right of way.

The Point of View at GHQ on Reorganization

The criticisms at GHQ of the successive proposals to redefine its authority or to reorganize the War Department were focused on the lack of an executive agency in the War Department capable of deal-

ing with operations comprehensively and promptly. In his 25 July memorandum, General McNair did not confine himself to specific proposals, but pointed out that under existing procedure "there is no War Department agency which at present can, with satisfactory promptness,

"*a*. Coordinate the defense of contiguous bases,

"*b*. Operate economic supply, replacement, transportation and evacuation systems,

"*c*. Effect efficient administration."

When the first plan for reorganizing the War Department was put forward by WPD in August, Lt. Col. George P. Hays, who represented GHQ in the August conference, emphasized the same point in expressing his dissatisfaction with the reorganization proposed. He could not find the strong executive agency required and felt that the failure to provide one "shows either an unwillingness on the part of the War Plans Division to face realities or a decision to put over a study in which the elements to furnish vitalization is implied rather than stated frankly." He believed that what the War Department machine needed was a "spark plug." "Responsibility should be clearly fixed in one individual, designated as Chief" of the desired command group. "His authority, under the Chief of Staff, to direct action by other War Department agencies must be unquestionable." His office "must not be drawn into current business nor should any other War Department agency be allowed to usurp its authority." When WPD produced its plan for increasing further the authority of GHQ, Colonel Hays returned to the charge:

"The basic concept underlying this study is that no real emergency exists and, therefore, there is no need, at this time, for the United States Army to prepare for combat operations. As long as persons in responsible positions within the War Department maintain this concept, they will successfully oppose the establishment of a command agency which can effectively prepare for and conduct combat operations. This study evades and offers no solution for the primary issue, i.e., that the United States Army now lacks an agency which is equipped to effectively prepare for and conduct combat operations, and that such an agency must be provided either in GHQ or within the War Department."

On 5 December 1941, two days before Pearl Harbor, General (Harry J.) Malony, the Deputy Chief of Staff, GHQ, commented on the "mission of GHQ" in these words: "The international situation is critical. Equipment is lacking. No adequate reserves are available. Experience to date indicates: (1) Transportation and delivery of supplies * * * is inefficient (Iceland); (2) Joint Board procedure is ponderous and provides no direct supervision . . . ; (3) War Department retains control in such detail as to make administration confusing; (4) War Department is not organized on a war basis."

In July, when planning and operational responsibilities had been given to GHQ, it had been decided that this headquarters was to be the executive agency of the War Department for "prompt decision and expeditious action," providing effective "coordination, conduct and control" of operations. Though powers were delegated to it only "if, as, and when," many officers at GHQ interpreted the step taken on 3 July as an action to implement the GHQ envisaged in the Harbord Report and embodied in the doctrine of the Army for twenty years. For several months after July 1941, the War Department, or at least the War Plans Division, adhered to that concept. Nevertheless, when the War Department delayed in giving GHQ the power it needed, or in creating some other "spark plug" agency, it seemed at GHQ that the difficulty "boils down to the War Department not wanting to give up any

authority." By December, after five months of strenuous effort, General Malony, who had been charged with making GHQ work as a planning and operational headquarters, reached the discouraging conclusions stated above.

Basic Problems Encountered in the Attempt to Strengthen GHQ, August-November 1941

The War Department was in fact faced with a situation which made GHQ, as conceived by the Harbord Board, a device difficult to operate. The essentials of such a GHQ were: (1) power to coordinate all operations outside the continental United States, and (2) prompt executive action. But in July 1941, the war danger was developing in "a number of relatively minor and widely scattered theaters," instead of one major theater as in 1917, and coordination was an extremely difficult task. On the other hand, it was quickly seen that to make GHQ effective as a command agency, or even as a coordinating agency, it would have to be given control of supply. In his memorandum of 25 July, General McNair pointed out that the command of each base theoretically under GHQ was actually divided between GHQ and two other War Department agencies. On 15 August, he expressed the opinion that GHQ should be authorized to issue instructions directly to other War Department agencies in connection with the means assigned for the operation of overseas bases and theaters.

The problem of supply formed the main obstacle faced by the 1921 plan for GHQ and became largely responsible for the dissolution of GHQ in 1942. Commenting on General McNair's 25 July memorandum, WPD promptly concurred in his idea "that control of supply is an essential element of command." But it stated, at the same time, that as long as a critical shortage of equipment and shipping continued and the demands of Lend-Lease, competing with those of the Army, had to be met, "rigid control by the War Department" would be necessary. The contention was raised that to give GHQ in Washington effective command of overseas departments, bases, and theaters meant giving it powers which would place it above the War Department. The Chief of the Army Air Forces granted General McNair's position that GHQ could not exercsie effective command unless given control of all agencies essential thereto. But the consequence, he declared, would be that "in substance, GHQ must have control of War Department agencies, Quartermaster Corps, Ordnance Department, etc." This conclusion was not believed at GHQ to be necessary. The need for higher coordination between the requirements of the Army and Navy and the demands of Lend-Lease was recognized. What was desired at GHQ was a block allotment of means to GHQ on the basis of a plan approved by the General Staff. But to this G-4 of the General Staff would not consent, insisting that it must review and check the supply and transportation requirements of all operations planned by GHQ and also pass on every requisition from a base, defense, or theater commander.

As early as 2 September, General McNair himself expressed doubt as to the workability of GHQ: "Speaking broadly, superior command of the operations of two or more theaters may be by either of two methods:

"*a.* GHQ—on the basis that the War Department is not organized suitably for the expeditious action required. It follows inevitably that, unless GHQ can be freed from the complications of War Department organization, there is little advantage and some disadvantage in having a GHQ.

"*b.* A War Department streamlined in the same general manner as Gen. Pershing streamlined his own GHQ—by establishing a Services of Supply. The War Department will then exercise superior command directly."

The second alternative seemed to represent General McNair's preference for solving the problem of supply. "The views stated in the basic memorandum (a WPD memorandum of 30 August), coupled with the brief experience of this headquarters to date, indicate that serious consideration should be given to the latter method—*b*—in spite of the upheaval involved."

On 21 October, no action having been taken in the War Department, General McNair returned to the issue, this time definitely stating his preference for reorganization: "I incline to favor the second line of action, to streamline the War Department by separating from it a zone of interior with its own commander, and absorbing GHQ into the War Department thus streamlined, and have rather indicated this view to the Chief of Staff."

Development of the War Department Reorganization Plan, November 1941—March 1942

The Chief of the Army Air Forces had advocated reorganization in the Board meetings in August. On 24 October, he launched a drive to realize his original recommendations. This was accompanied by a proposal to enlarge still further the autonomy of the Air Forces by a revision of AR 95-5 as published in the previous June—a revision which, in the opinion of General McNair, would have effected a "separation of the Air Force from the rest of the Army as complete as the Commanding General, Army Air Force, chooses to make it." In the first of a series of Air Force memoranda advocating reorganization of the War Department as against enlargement of the authority of GHQ, General Arnold's headquarters revived the proposals for reorganization put forth by WPD in August. In the second of these memoranda the Army Air Forces outlined its own plan. It was in two parts. Part I proposed the reorganization of the Zone of Interior into three commands—air, ground, and service. Part II recommended the creation of a "Military Policy Staff" representing the Army, the Navy, the State Department, and the Economic Defense Board, under a chief of staff. General Marshall declared himself to be "favorably impressed by the basic organization proposed," but Part II was excluded from the further study now ordered. He directed WPD to develop Part I with a view to "determining its practicability and the extent to which it is an improvement over the present organization." It thus became the working basis for the reorganization put into effect on 9 March 1942. General Marshall's directive is dated 25 November 1941. From that date forward there is no trace of a further attempt by the War Department to make GHQ workable for the purpose for which it had been designed in the Harbord Plan.

Both the WPD plan, sketched in August, and the plan now proposed by the Army Air Forces had a common central feature. Both proposed the delegation of the operative functions of the War Department in the Zone of Interior to three major commands, the Army Ground Forces, the Army Air Forces, and the Services of Supply. Both accepted the Army Air Forces as established by the terms of AR 95-5, 20 June 1941. Neither was clear as to where command or supervision of the four internal defense commands was to be lodged. Neither provided for an integration of the offices of the chiefs of branches, though they were subordinated in both plans to the Zone of Interior commands. In the WPD plan, they were all placed under the commanding general of the Services of Supply. In the Air Force study, the chiefs of Infantry, Cavalry, Field Artillery, and Coast Artillery were placed under the commanding general of the Army Ground Forces. Furthermore, the WPD study assigned to the Services of Supply not only West Point, the general and special service

schools, and officer candidate schools, but also the boards of the arms and services, civilian component training and administration, and air-raid precautions. All these agencies and functions were given a different distribution in the final reorganization.

When interviewed at a later date, Army Ground Force officers who were on the staff of GHQ during the winter of 1941-42 seemed to feel that the reorganization of 9 March was "sprung" by an inner circle of planners in the War Department. This impression probably related to certain phases of the reorganization, not to the plan in its entirety.

The minutes of the daily GHQ staff conferences show that, at least until mid-October, the debate in the War Department regarding the status of GHQ was being reported to its staff. There is no indication that General McNair's conclusion, stated in his memoranda of 2 September and 21 October, that a reorganization of the War Department was probably desirable was not known to his immediate advisors at GHQ, including General Malony, if not to all members of the staff. The record shows that on 5 February 1942, General McNair discussed the plan of reorganization with Maj. Gen. Joseph T. McNarney, who had been recalled from England to take charge of it. The criticisms which General McNair submitted in writing the next day raised no serious objections. On 4 March, he wrote: "The new organization seems entirely sound. The experiment of having GHQ operate—which has been underway since last July—was foredoomed to failure in my estimation, since the War Department could not turn over its responsibilities in that connection. The alternative is what is now being done—the Services of Supply—just as in the AEF."

It is clear, therefore, that the principles underlying the plan for reorganization were known at GHQ from the first, and it can hardly be doubted that the staff was aware of the views of its chief. On the other hand, no evidence has been found to indicate that it was informed of the decision of General Marshall on 25 November to set up a committee to work on a specific plan. Certainly as late as 5 December, General Malony still believed that there was a fighting chance for the enlargement of GHQ's operational authority. GHQ was not represented on the committee initially entrusted with formulating a plan of reorganization. Only on 11 February, was formal notice received at GHQ that the proposal to reorganize the War Department was under consideration and that an executive committee was to be created under the chairmanship of General McNarney. GHQ was directed to select a representative, and Col. James G. Christiansen was appointed. At this date the contents of the plan were known at GHQ, for the minutes of the staff conference on 11 February record the following comment of its G-3: "Proposed reorganization of WD still leaves burden on General Marshall."

Given these circumstances, several reasons may be conjectured for the later impression that the plan of reorganization had been sprung suddenly on the group working at GHQ. The specific plan which was adopted and which apparently was worked out between 25 November 1941 and 11 February 1942, without the knowledge of GHQ, included a novel form of staff organization for Headquarters, Army Ground Forces, which that headquarters found unworkable and rejected on 12 July 1942. This probably contributed to a feeling that the plan of reorganization was excessively theoretical, and intensified the disfavor with which it was bound to be regarded by the group at GHQ who had enthusiastically supported General Malony in his effort to make GHQ the driving force in the Army high command, and through it to speed up and invigorate the

executive action of the War Department as the United States moved into the dangers of open warfare.

The reorganization adopted had three main features: (1) Top control of the field forces was kept in the War Department General Staff, and the Zone of Interior functions of the War Department were delegated to three great commands, the Army Ground Forces, the Army Air Forces and the Services of Supply—an organization designed to "follow functional (task) lines." (2) The arms and services were subordinated to these commands. The technical services, together with the two combat services, the Engineers and the Signal Corps, were assigned to the Services of Supply. The arms and the new quasi arms were assigned to the Army Ground Forces. The services remained in being as organized, but their chiefs were subjected to the authority of the commanding general of the Services of Supply. In the case of the arms a different principle was followed. The chiefs of the four traditional arms disappeared. Their authority was vested in the commanding general of the Army Ground Forces, and their agencies were reassorted and integrated with the other agencies of that command. On the other hand, those of the newly developed combat arms, Armored, Tank Destroyer, and Antiaircraft Artillery (separated from the Coast Artillery), remained or became distinct commands, under the commanding general of the Army Ground Forces. (3) GHQ was liquidated, and all theaters of operations and the four defense commands of the continental United States were placed directly under the War Department General Staff. WPD, shortly to be known as OPD (Operations Division), took up the planning and operational functions which had been exercised since July 1941 by the staff of GHQ.

By these changes the War Department sought to relieve the General Staff, and its Chief, of operative and detailed administrative duties in order to set them free to devote themselves to planning and over-all supervision. This purpose had also been one of the main objectives of GHQ, but had not been fully realized largely because the powers delegated were insufficient, and the current international situation made it impossible to carry out the original plan of the Harbord Board.

Summary

In this reorganization of the War Department, the Army Air Forces, according to the evidence available, took the lead and supplied the drive. Its motives were clearly stated in its memoranda on the subject. The authority of GHQ, as constituted on 3 July 1941, overlapped the position which the Air Forces had gained as an autonomous entity on 20 June 1941. The proposed enlargement of the powers of GHQ would have limited this independence even further. Such a development did not coincide with the ideas current in the Army Air Forces, which aspired to still greater freedom of action in the belief that the effective prosecution of modern warfare required a fully autonomous air arm. The Chief of the Army Ground Forces sought to protect and regularize the new position of the Air Forces by a reorganization which would give the Ground Forces and the Services of Supply a similar autonomy. This objective was in general attained, though the simultaneous proposal to institute a command transcending that of the War Department was not carried out.

Though the Army Air Forces played a prominent role in the reorganization, many other factors and considerations contributed to bringing about the administrative changes in the War Department effected in March 1942. In the circumstances imposed by the course of events, a GHQ on the lines of the Harbord Plan was subject to grave disadvantages. These became evident to General McNair as well

as to other observers, as soon as the attempt was made to administer such a headquarters or develop plans for its future. War had come upon the United States in an unanticipated form, and the conclusion was reached that it had to be waged with new administrative as well as with new technical and tactical weapons.

Furthermore, new developments like armor and tank destroyers were cutting across the pattern on which the traditional arms were organized. These changes, implying refinements of specialization and new tactical combinations, brought to a head the old question of the arms and services and their relation to the General Staff. Though the chiefs of the arms and services were less independent than formerly, their actual relation to the General Staff made difficult the close command and staff planning as well as the coordination and training necessary to produce flexible and hard-hitting teams of the combined arms. The old pattern of tactical organization had to be adapted to the new type of warfare. Moreover, the existing combat arms had developed, together with a desirable branch loyalty, an aggressive and somewhat jealous branch spirit, which the new quasi arms tended to emulate. The proposed reorganization of the War Department offered a means of bringing the arms and services under firmer control.

Given these circumstances, the type of reorganization first put forward in the WPD memorandum of August made a strong appeal. General McNair favored, and the Air Forces pressed for, reorganization. The final plan, which delegated the complex Zone of Interior responsibilities of the War Department to three subordinate commands, offered the War Department General Staff an opportunity to perform its over-all planning and directive duties with greater efficiency. It effected, under these three major commands, a coordination of the services and an integration of the arms in better accord with their future use in combined operations.

In the reorganization, as announced, no explicit provision was made for centralized control of operations in widely scattered theaters, specifically, for "an executive group" within the War Department which "would in reality be a command section." The absorption of the operational element of GHQ into the War Department as a means of meeting this need had been rejected, and the officers composing the element in GHQ were not utilized to form a new group in the War Department. But a new group was formed in WPD, which, under its later title of Operations Division, became, in effect, the command post of General Marshall in Washington. GHQ, in its executive activities, had forecast and confirmed the need for such an agency, but was not made that agency. It is evident from the foregoing study that the motives and circumstances that led to its rejection were complex. They included organizational and personal interests and rivalries which inevitably attend the development of a new and forceful institution. The mere physical location of GHQ apart from the rest of the War Department, and the fact that at the moment there was no room in the old Munitions Building for another agency, perhaps played a part. Connected with this factor, and probably more important in determining the view taken of GHQ as a command post, was the fact that, as such, it was encased in the old conception, inherent in the plan of mobilization projected in 1921, that GHQ was destined to go overseas as the headquarters of the field forces—a conception that had promptly been antiquated by the circumstances of the oncoming emergency in 1941. GHQ had at least served a useful purpose in demonstrating the necessity of substituting for this concept that of a single agency in Washington qualified to achieve "prompt decisions and expedious action."

General Headquarters, United States

Army, closed *sine die,* and Headquarters, Army Ground Forces, opened at the Army War College on 9 March 1942. Although GHQ had not completely fulfilled the purpose for which it had been intended originally, it had been conspicuously efficient in making and implementing theater plans. It had from the outset performed with notable success the mission of training with which it had been entrusted initially. This, in general, was the view taken by representatives of the War Department in the discussion of its fate during the fall of 1941. GHQ had become more than ever the command agency which directed the training and shaped the organization of the ground army for combat. These were to be the two principal missions of the new command with which General McNair was now entrusted.

Neither war nor preparation for war is ever static. As weapons improve and change and become more effective, as distances disappear before the speed of aircraft, as world conditions and world alignments are altered, as a new list of possible enemies emerges and as the military power of these possible enemies develop—as all these things occur, the requirements of preparedness change and shift—in tactics, in strategy, in organization and in supply.

* * *

There was a time early in the war when other countries—neutrals as well as enemies—thought the war job which we had cut out for ourselves was an impossible one—that no nation could overcome the lead which the Axis powers had gained—that none could overbalance the power which Germany and Japan had built up.

But we Americans knew that we could win, that we would win. We knew that we would throw behind our task the heart and mind and sinews of the greatest nation on earth. We knew that industrialists and laborers and farmers would rise to the responsibility imposed upon them.

Secretary of the Army Kenneth C. Royall

The Use of Terrain Exercises in Training

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THE training of commanders and staff officers is an ever present problem in our peacetime military establishment. As long as our training doctrines contemplate having officers prepared to organize additional units at some specified time in the future, we must continually consider the training of these officers. This is especially true of officers of the civilian components. In Organized Reserve units, the officers rarely have the opportunity to gain experience with large troop units. It applies, to a lesser degree, to the officers of the National Guard where, during the summer training period, it is sometimes practicable to assemble large units in one locality. Field exercises can, therefore, only be used to a limited degree. Thus the bulk of the training of the officers of these categories must, of necessity, include applicatory tactical exercises which do not involve the use of troop units. Their training plan must include the use of map problems, command post exercises, map maneuvers, or terrain exercises. Training in command and staff procedures and techniques through the medium of command post exercises or map maneuvers has been discussed in an article "Preparation of Map Exercises," published in the January issue of the MILITARY REVIEW. In addition to these types of applicatory tactical exercises, there in another that can be used to great advantage in the training of officers of the civilian components, that is the terrain exercise.

A great deal of tactical and administrative instruction can be given through the medium of map exercises, but this involves study of a map with the decisions and plans based on this map study only. This type of instruction offers no opportunity for actual reconnaissance of the terrain being used and no substitute has been devised for this reconnaissance. It is true that in combat the plans for many operations have their inception in map studies, but whenever possible, this is followed by a reconnaissance of the ground. In this denial of the opportunity for reconnaissance, the map exercise loses some of the realism of combat conditions. This loss of realism also applies in another respect. In the preparation of map exercises it is customary to select a particular piece of terrain, because it appears to bring out the principles to be taught, although if a ground reconnaissance were possible it might prove to be not so suitable.

The terrain exercises offers an opportunity to overcome these deficiencies of the map exercises. By utilizing terrain that exists in the immediate vicinity, a group of officers can apply tactical principles to given exercises with the realism that can be achieved through actual reconnaissance. It provides a relatively easy and extremely valuable method of training officers to understand how to make the maximum use of terrain in the selection of a scheme of maneuvers, the disposition of

units and installations, and similar tactical and administrative functions.

Preparation of the Exercise

Consider the case of the G-3 of the 901st Division (either infantry or armored; either Organized Reserve or National Guard). Most members of the division staff are located in Midville. They are engaged in their current training program, and most of the officers have been pursuing Army Extension Courses. In the instruction given in their schools, G-3 has required the staff to solve several map exercises and participate in several command post exercises which he has prepared. With this work completed the opportunity presents itself to conduct some of the training outdoors. Why not have the members of the staff solve a series of terrain exercises? G-3 can prepare exercises which will illustrate the tactical principles that have been covered in the previous instruction. For instance, he can have an exercise involving the division in a march from one area to another, preparations for an attack, or the organization of a defensive position. Exercises or problems involving these principles may have been solved on a map, but they may be reviewed by solving similar exercises on the ground.

What problems present themselves in conducting these exercises? A large reservation is not necessary, because terrain in the immediate vicinity of Midville can be selected. The division staff can assemble at some point and spend half a day or a full day making a terrain study and solving the requirements on the ground rather than at the armory or their regular meeting place.

What are the steps that G-3 must follow in preparing this terrain exercise? First of all he must determine the tactical principle or principles he wishes to illustrate. Having made this decision, he must then select terrain suitable for illustrating these principles. He should select the best available terrain, but should not feel compelled to select so-called "ideal" terrain to illustrate a particular principle. He should bear in mind that commanders in combat must make use of the terrain upon which they find themselves. By "available" is meant that terrain which will be accessible to the officers solving the exercise. A national or a state park may be located nearby or perhaps the grounds of the local country club can be used. If these are not available, arrangements will have to be made with the individual owners of adjacent farm land in order to allow the participating officers access to this terrain. This can generally be done if the group is small, but if the size of the group is increased, G-3 may be forced to limit reconnaissance to roads and such vantage points for observation as can be used. Generally within an area selected, there are points such as road intersections, school houses, or the outskirts of a small village where a large group may be assembled, and from which it is possible to observe and study the terrain.

Another factor to be considered for the selection of the terrain is the matter of time and space. In a map exercise or map problem, the participant remains in one building and solves the requirements on a map. In this case, the decisive time factor to be considered is how long it will require the participants to solve the given requirements. In the conduct of a terrain exercise, however, if a certain amount of time is allocated, the exercise must be so drawn that there is time for travel to the terrain being used, time for reconnaissance, and time to return to the starting point, in addition to the time required to solve the requirements. For example, if terrain is selected which is some eighteen miles from the starting point, approximately two hours would be required to travel to this area and return. If the limitation of three hours for the conduct of the exercise has been imposed, there is only

one hour remaining for the necessary reconnaissance and the solving of the requirements. If it is possible to find suitable terrain for the exercise within thirty minutes travel time, it would permit two hours for reconnaissance and the solving of requirements. It is apparent that the amount of instruction that can be given in a terrain exercise has a direct relationship to the time consumed in traveling to and from the area utilized in the exercise.

With these considerations in mind, G-3 should proceed with his selection of the terrain for the exercise. If possible, he should obtain some aerial photographs of the area near Midville, but if the area has not been photographed and the air forces in the area are not able to make photographs in time for the exercise, he must secure good maps of the area. He must make a careful study of the map before arriving at his selection. By a thorough consideration of all aspects of the exercise while making this map study, he can save himself a great deal of difficulty as he develops the exercise itself.

Having selected the terrain, G-3's next step in preparation of the exercise is the formulation of the situations and requirements to illustrate the required principles. He should guard against making the requirements too complicated, and they should be such that their solution requires the study and use of the terrain. Bearing this in mind, he should prepare a written outline of the entire exercise which will include the situation and requirements that are to be issued to the participating officers and a tentative solution to the requirements. In this preparation, the process is practically the same as for a map exercise, since up to this point the work is done on a map or aerial photograph. The same principles as those for preparing a map exercise apply. The form for the situation and requirements is the same. The material to be included is practically the same; the chief differences lie in statements regarding weather, the condition of roads or bridges, and the fordability of streams. These should be played as they actually exist on the day of the exercise. With the exercise drawn in outline through this preliminary work, it should be transferred to the map or photographs that will actually be used by the participants. If aerial photographs are not available for use in the exercise, a state or county road map should be used. It should not be contoured, as the use of a contoured map by the participants in a terrain exercise will defeat the purpose of requiring thorough terrain study in solving the exercise.

At this point, a tentative time schedule for the entire exercise should be prepared, making provision for the travel, reconnaissance, and solving of requirements. If the exercise is to be closely controlled, the route of reconnaissance and times allowed for each halt should also be included. With this completed, G-3 has done all the work he can do at his desk, he is now ready to go out on the ground and check these preliminary preparations.

G-3's first trip over the area will accomplish several things. First, it will give him a general idea of the entire area which he has selected for the exercise. In addition, there are specific things that should be checked, such as the bridges that actually exist on the ground, the condition of the streams in the area and important buildings or landmarks. It is rather disconcerting to plan on the map to make use of a certain bridge and then find on reconnaissance of the area that it no longer exists. Also from this reconnaissance it is possible to make a tentative selection of assembly points for participants which will be necessary for the issuance of material or the turn-in of solutions. In addition, he can determine the actual distances between certain points in the area in order to verify his time schedule for the exercise. G-3 should make notes

of all these things as they relate to the various portions of his outline of the exercise.

The next task is accomplished at G-3's desk. With the necessary maps or photographs, and from the notes he has made on his reconnaissance, all the details of situation, the requirements, and the solutions to the requirements should be completed. He now has a complete draft of the entire exercise. Upon completing this written work he should again make a reconnaissance of the area. On this reconnaissance he should verify all the details of the exercises as they actually apply on the ground. This work should be done from the viewpoint of the participant, actually following the time schedule and making a final check of the solution on the ground. At this time he can inject some local color into the exercise, such as a reference to the red barn, the stone bridge, or the old school house on the hill. A return to the desk results in a final revision of the entire exercise. The exercise is now in the form in which it will be presented to the remainder of the staff for their solution.

There are some administrative details that must also be accomplished in connection with the exercise. G-3 must provide for access to private property if this is necessary. Transportation must be arranged for, either government vehicles of the unit or the individual transportation of the members of the staff. If it is an all day problem, he must make arrangements for lunch. All these are administrative details which will vary under local conditions, but their inclusion is as much a part of the G-3's preparations as the writing of the actual exercise. For a small group they are comparatively simple, but if a large group of participants is involved, these administrative features present a larger problem. With the larger group, consideration also must be given to parking areas for transportation, a loud speaker system, and possible traffic control arrangements for the convoy of vehicles.

Conclusion

These are the steps in the preparation of a terrain exercise. Their accomplishment results in a form of applicatory training that provides an excellent means of teaching principles and, more particulary, their application on existing terrain. The requirements presented to the officers participating in the exercise can be varied to bring out various aspects of military instruction. They can be tactical in nature, involve administrative principles, and develop the use of all arms and services. The procedure outlined for the G-3 of this theoretical division may be applied to other units; armored, airborne, or service units.

Consideration should always be given to future trends of warfare by injecting into exercises the use of weapons and techniques that are being developed by our present day research. The value of the applicatory type of training is increasing in importance as more and more units are organized as part of our military establishment. The terrain exercise becomes an important phase of the training plan of these units and the commander and his staff should make full use of the opportunity afforded by this type of exercise.

A Concept of Air Power

Colonel Roger J. Browne, *Air Corps*
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TO an air officer, the difference between tactical aviation and strategic aviation lies in the method of application of military air power. The employment of the Strategic Air Forces and the Tactical Air Forces complement each other to the extent that it is difficult to determine where the employment of tactical aviation ceases and strategic aviation takes over. All military aviation, within the technical limits of equipment, can be employed in either a tactical or strategic role; it is but a question of arriving at a well balanced force. If we accept that statement, let us go on to examine air power, its doctrine and its employment.

First, we must arrive at a definition of terms before we can begin analysis. Well over twenty years ago, General "Billy" Mitchell said, in *Winged Defense*, "Air power may be defined as the ability to do something in the air. It consists of transporting all sorts of things by aircraft from one place to another, and as air covers the whole world there is no place that is immune from influence by aircraft." While that statement was made in 1925, the thought behind it is as true today as it was then. In 1943, in his book, *The Use of Air Power*, Flight Lieutenant V. E. R. Blund said:

"Air power is not, as a great many people suppose, the ability to put bombers and fighters into the air in large numbers, any more than sea power merely represents the ability to put large numbers of warships on the sea.

"Sea power is built up of ship building capacity, of strategically placed ports and naval bases, and of ships, all enabling vast quantities of material to be transported to places and positions where it will serve its purpose best. It does not matter whether that cargo is a peaceful cargo of wool, or a fifteen inch shell fired from a battleship and exploding on a target. It is sea power which has got it there.

"Air power is exactly the same. It consists of the capacity of aircraft factories, the number of strategically placed aerodromes and bases, and of planes, all enabling vast quantities of material, both warlike and peaceful, to be transported and placed in positions where they will serve their purpose best. It does not matter whether the material transported is mail, parachutists, infantry, guns, shells or bombs. It is air power which gets it there."

The present concept of air power was expressed best by General of the Army H. H. Arnold, former Commanding General Army Air Forces. "Air power includes the nation's ability to deliver cargo, people, destructive missiles and war making potential through the air to a desired destination to accomplish a desired purpose.

"Air power is not composed alone of the war-making components of aviation. It is the total aviation activity—civilian and military, commercial and private, potential as well as existing.

"Military air power—or air force—is

dependent upon the air potential provided by industry . . ."

The thought expressed by General Arnold is about as clear and concise a definition of air power as can be expressed in words. Basically, air power consists of three factors, the air industry, air commerce, and the Air Forces. To these three basic factors must be added geographical position, national dependencies or territories, the number and character of the population, the character of the national government and its policy regarding aviation, weather and such other factors as affect flight. It is apparent that air power is a part and parcel of national power. Military air power is air force.

With that definition in mind, let us examine how air power was applied in this past war, both by our enemies and ourselves. In the *blitzkrieg* of 1939, Germany literally swarmed over Poland by using the massed weight of her Army and Air Force. After almost immediately gaining aerial supremacy by sheer weight of numbers, the *Luftwaffe* was employed in direct support of the *Werhmacht*. Again in 1940, Germany overran the Lowlands and France by employing armor, spearheaded by the *Stukas*. The *Luftwaffe* became the scourge of the skies, crushing everything beneath it. Dashing across France, the *panzer* divisions, led by the *Stukas*, met little or no opposition. The study of *panzer* attacks and air-ground coordination became the order of the day. We were stunned by the instantaneous success of this new team. Against Poland, Holland, Belgium and France, countries with little or no air power, Germany had reigned supreme.

But what happened against England in the Battle of Britain in the late summer and fall of 1940? The *Luftwaffe* was improperly and indecisively employed.

England gave proof that a country that maintained command of the skies over her sovereign soil could not be invaded. Though her army had been almost annihilated at Dunkirk, England preserved her sea power and her air power, rebuilt her armies and went on to gain the eventual victory.

The *Luftwaffe* was tied to the *Werhmacht*. The Germans had the "Fighting Forces Concept" of the employment of air power. To them, the airplane was just another gun to shoot down front line soldiers. They had no strategic air force worthy of the name. Their aircraft were designed for short range, limited bomb load, tactical bombing in front of the ground forces. Their attempts at strategic bombing, as we know it in the United States, were pitiful in their attempt. Looking back, one cannot pick out a single system or target complex that they destroyed. The *Luftwaffe* lost the air war because of a lack of proper concept of the employment of air power.

The Japanese, being the perfect mimics that they were, copied blindly the German concept, a concept that had been so successful against nations without true air power, but a concept that was defeated by proper air thinking. At Pearl Harbor, the Japanese effectively neutralized our Pacific Naval and Air Forces but they did not strike at our sea or air power. They, too, employed the "Fighting Forces Concept." They destroyed an outpost, they sank ships and they burned planes on the ground, but they did not strike at the basis of our sea or air power. We lived to rebuild ships and aircraft and to carry the war to their homeland and to effectively destroy their will and means to fight.

The Japanese had an Army Air Force and a Navy Air Force. Under this division of command, parcelling some aircraft to the Japanese Army, and other aircraft to the Japanese Navy, it was easy to defeat each force in detail. There was no strategic air force, as such, in the Japanese conception of the employment of air power. Mr. James Trapier Lowe in "Aviation and War" (*Air Affairs*, September 1946) said:

"The Japanese finished the war with the battle or raid idea connected with aircraft. The strategic concept of military air power consisting of balanced air forces that could be operated independently of ground and sea forces to achieve decisive results in wars (not battles or raids) remained foreign to the Japanese until the bitter end."

On the other hand, what was the American concept of the employment of air power? There have been arguments in our Armed Forces ever since the day the Wright Brothers delivered their first military aircraft to the U.S. Army as to the proper employment of this new war machine. This argument has not been confined to soldiers and sailors alone, but has run the gauntlet of strategists from amateur to professional. Some claimed that the airplane would be a new weapon; it would add fire power to armies and navies. The advocates of this theory placed the aircraft in a supporting role like artillery. This was to be the role of the airplane in war. However, we had other visionaries who contended that the airplane could do this, yes, but could also effect the oldest strategem since the days of the Trojan Horse, i.e., get into the rear of the enemy and destroy his means to fight. These visionaries believed that by destroying the enemy's real and psychological ability to wage war, the enemy could be defeated. We, in America, should be thankful for these visionaries. We should also thank those far sighted men in the United States and British Armed Forces who wrote the directive to the Strategic Air Forces in Europe for the Combined Bomber Offensive. The aim of military air power can be put in no better words than those used at the Casablanca Conference, ". . . the destruction and dislocation of the German military industrial and economic system and the undermining of the morale of the German people to the point where their capacity for armed resistance is fatally weakened." As every student at the Command and General Staff College or at the Air University knows, "The ultimate objective of air power is to force the capitulation of an enemy nation by air action applied directly against the vital points of its national structure." That is a far cry from the words of General C. P. Summerall when he said, "As far as we are concerned, in war, the only objective, is the enemy's army. If that fails, everything fails. A bombing expedition must, therefore, be made as something connected with the enemy's armed forces."

The decisiveness of military air operations cannot be denied by anyone who has seen Berlin, Nurnberg, Kassel, Essen, Tokyo, Kobe, or Nagoya. Over each of these, and many other cities, were fought real battles comparable to Cherbourg, Brest, Metz, Aachen, or Bastogne. The air campaigns against petroleum at Ploesti, synthetic oil production at Leuna, the aircraft industry in February 1944, or burning Japanese cities were just as much campaigns as Normandy, Central France, the Ardennes, Leyte, or the Mariannas. The effectiveness of these campaigns are apparent when one realizes that they made the invasion of *Festung Europa* possible and the landing on the island of Honshu unnecessary.

Mr. Lowe states that military air power emerged as the dominant force in war. While it may be preferable to wait for further evaluation before going that far, it is interesting to note that General of the Army Eisenhower, in an address before the National Press Club said, "The War Department believes that the Air Force has proved it occupies a dominant position in war."

Does this mean that armies and navies are obsolete or even obsolescent? No, not even the most fanatic exponent of air power can answer that question in the affirmative. No one component of the Armed Forces of this country won the war alone. It was a well balanced team of land forces,

sea power, and air power that forced the capitulation of the Axis powers. This trinity, this team, was directed into perfectly coordinated attacks until Germany and Japan were forced into unconditional surrender.

It is axiomatic that military air power, once it has gained air superiority to the extent of freedom of the skies and employed in sustained mass, can be decisive against any country. To accomplish this, two requirements must obtain: first, the air bases must be near enough to permit attack against this enemy; second, the bases must be well stocked and sustained for continuous mass air operations. To date, these two factors alone require the full support of the ground and naval forces.

If these facts alone were not enough, one has to but consider the problems of occupation. While it is true that the air occupation of Japan started in April 1942, with the Doolittle raid on Tokyo, and the occupation of Europe started with the Eighth Air Forces' first raid 17 August 1942, it must be admitted that the airplane is poorly designed as a vehicle of occupation. To impose our will completely, to de-militarize, to de-nazify, to democratize it is necessary to occupy the enemy country in detail. Permanent ground occupation being impracticable, perhaps going back to aerial occupation may be necessary. It remains to be seen whether or not military aircraft can effectively police a conquered country by unrestricted flights over an otherwise sovereign state.

For these reasons, and other reasons that are so obvious as not to warrant mention, it is obvious that future wars will be fought with all three elements of the Armed Forces operating as a well balanced, coordinated team.

The successes enjoyed by the German Air Force in a battle, confined primarily to Ground Armies, may have contributed to our early fallacious comprehension of "Tactical Air Power." It is fortunate, indeed, that the RAF on the western desert had evolved a totally different tenet. This new concept expounded the thesis that "Tactical Air Power" should constitute a separate and distinct force, co-equal and independent of the ground forces. Further, this precept submitted that local air domination must be achieved before a major ground campaign may be launched with reasonable assurance of success. Thus, we see an evolution of a concept under stress and disaster that permitted and readily accelerated the exploitation of "Tactical Air Power" in the air and ground campaigns.

Major General E. R. Quesada

The Marshall Islands Operation — *Eniwetok*

Vice Admiral Harry W. Hill, *United States Navy*
Commandant, National War College

This article supplements one of the same title which appeared in the January 1948 issue of the MILITARY REVIEW.—The Editor.

General

CINCPAC had been directed in the original directive for the Marshalls Operation to seize or control Wake, Eniwetok and Kusaie during, or upon completion of, the initial tasks. The expeditious and successful manner in which the amphibious operations against the Kwajalein Atoll objectives had progressed led Admiral Turner on D+1 to recommend that the Joint Expeditionary Troop Reserve be used to capture Eniwetok immediately after the completion of the capture of Kwajalein, using such ships of the Joint Expeditionary Force that could be made available. D-day was established as 17 February.

Major Supporting Operations

Since Eniwetok Atoll lay over 330 miles west-northwest of Kwajalein, it was believed that the enemy would strongly resist any attempt by the U. S. Forces to occupy it. Therefore, it was decided to execute strong supporting operations to take place concurrently with the amphibious assault on Eniwetok. These included strikes on strategically located enemy bases by both carrier and land-based aircraft. The first major attack on Truk was made by a powerful carrier-battleship task force on 17 February under command of Vice Admiral Spruance. This was a particularly successful attack, accounting for twenty-six merchant vessels, two cruisers, three destroyers, and more than 300 enemy planes.

On 22 February, a part of the same task force ranged still farther to the northwestward and struck the first blow of the war at enemy bases in the Marianas, attacking Saipan, Tinian and Guam, and accounting for another 150 Jap planes. Land-based air forces continued strikes against Ponape, Kusaie, and Wake. Further neutralization attacks by both surface and air forces were made against the remaining enemy-held bases in the Marshall Islands. As a consequence of these supporting operations, especially the attacks on Truk and the Marianas, the enemy was unable to make a single air attack against our forces during the assault on Eniwetok.

Organization and Command

Forces assembled for the amphibious assault on Eniwetok were under the command of Rear Admiral Hill. These forces were designated as the Eniwetok Expeditionary Group and were organized into a transport group, fire support group, escort carrier group, carrier task group, minesweeping group, service group, and the expeditionary troops. The principal components of the latter were the 22d Marine Regiment, reinforced, and the 106th Infantry Regiment, reinforced, plus attached tank, amphibian tractor, reconnaissance, etc., units. The Expeditionary

Troops were under the overall command of Brigadier General Watson, USMC.

Preliminary Operations (Figure 1)

Mention has been made of the carrier strikes made on Eniwetok Atoll commencing on 30 January and continuing daily until 6 February. In order to continue neutralization of Eniwetok during the consolidation phase at Kwajalein and also in preparation for the attack on Eniwetok itself, further carrier strikes were made on 10, 11, and 12 February. These strikes were mostly centered on Engebi Island where the Japanese airfield and main defenses were located, but Parry Island was also attacked. On 13 February, this carrier task group came under the operational control of the Commander, Eniwetok Expeditionary Group, and, after a short rest and resupply at Kwajalein, it departed for Eniwetok on 15 February and resumed its strikes on 16 February.

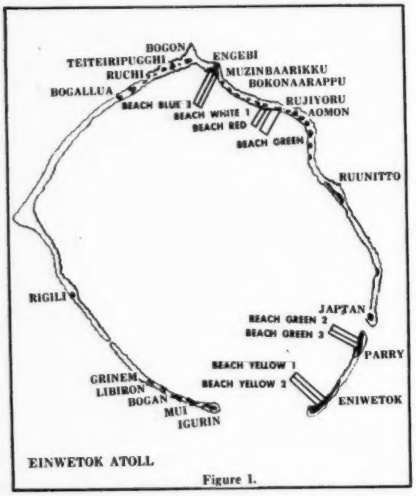

Figure 1.

The seizure of Eniwetok Atoll involved successive amphibious assaults on three strongly fortified islands, Engebi, Eniwetok and Parry.

Plans required the entrance into the lagoon of most of the ships of the Expeditionary Group immediately upon arrival on the morning of D-day. In order to prevent damage from possible enemy minefields, minesweeping vessels with sweeps streamed, immediately preceded all other vessels into the lagoon and into assigned anchorages and operating areas. A large Jap minefield was encountered in the southern portion of the lagoon which caused some difficulty, but no serious delay resulted. Following closely behind the minesweepers, other vessels entered the lagoon. The LSTs and smaller vessels entered via Wide Passage, and the transports and fire support ships entered via Deep Entrance. Although these passes were narrow, and the islands bordering them were fortified, for some unknown reason the Japanese commander had directed his troops not to disclose their presence. As a result, this hazardous passage was successfully negotiated without an enemy shot being fired.

Engebi Island had been selected as the first island to be captured. Bombardment of this island commenced early on the morning of 17 February, D-day, and continued without interruption until our troops landed on the following day. Artillery was landed and registered on Rujiyoru Island, in early afternoon, in readiness for support of the assault the following morning.

Assault Operations

The main event on D+1, 18 February, was the seizure of Engebi Island. Following the usual intense bombardment and air strikes, the assault troops (22d RCT) landed at 0830. Enemy resistance was quickly overcome and by 1600 the island was occupied. While the attack on Engebi was proceeding, the 5th Amphibious Corps Reconnaissance Company on the eastern islands and the Scout Company (from 7th Infantry Division) on the western islands were methodically examining and securing the smaller islands along the reef.

During the afternoon of 18 February, since the operations on Engebi were proceeding in a satisfactory manner, advance preparations were made for the landing on Eniwetok Island the following day. Various sources of information, obtained since arrival of the Task Group at Eniwetok Atoll, indicated that both Eniwetok and Parry Islands were much more heavily defended than originally believed, and so considerable change in plans had to be made.

On the morning of 19 February, Eniwetok Island was subjected to the usual heavy and destructive gunfire just prior to the landing of the Assault Troops (106th Infantry). Within about an hour our troops had cut out a path across the island, but enemy resistance stiffened, and Eniwetok Island was not secured until 1740, 21 February.

Due to the slow progress of the fighting on Eniwetok Island and information that Parry Island was even more strongly held, further changes in plans for the attack on Parry Island were made. It was decided to delay the assault on the island until 22 February.

For the landing on Parry Island the 1st and 2d Battalions of the 22d Marine Regiment were selected to make the assault. The landing was successfully accomplished at 0900 on 22 February. The first wave met some opposition at the beach, but advanced rapidly inland about 100 yards, but thereafter the advance was slower. At 1930, the island was declared secure, but mopping up operations continued throughout the night and until 1000 the following morning.

The cessation of enemy resistance on Parry Island, on the morning of 23 February, marked the end of the assault phase and the beginning of the occupation phase. At 0800 on 2 March (D+14), the assault and occupation phase at Eniwetok was terminated by orders of Admiral Spruance and command of the Atoll passed to the designated Atoll Commander.

Lessons Learned

What were the principal lessons learned, which were to be applied in subsequent operations both in the Southwest and Central Pacific?

a. First of all, the lessons of Tarawa had been confirmed, namely:

(1) That carrier task forces could, with acceptable risk to themselves, maintain themselves in close proximity to the assault area and establish undisputed control of the air.

(2) That troops could be successfully landed and supplied on reef-fringed atolls, if provided with adequate amphibious craft.

(3) That before troops were landed, enemy beach defenses could be destroyed by heavy close range bombardment and pin-point bombing. The naval and air bombardment preparation exceeded in duration and intensity anything previously known to warfare except possibly that at Verdun in World War I. It has been estimated that fifty per cent of the Japanese defenders were killed by bombardment prior to the assault, not to mention the destruction of material and morale. It must also be noted that the intensity and duration were not the only factors, but that here, selection of the type and weight of projectile or bomb required for a specific target was the rule, instead of the exception.

(4) That close air and gunfire support of troops was practical and very effective, but required good communications and positive control. Air support for this operation reached the highest point of perfection yet displayed in an amphibious operation. This was contributable to several factors, the principal ones being:

(a) The use for the first time in Pacific operations of a special amphibious command flagship with adequate radio, radar, etc., facilities aboard.

(b) Training and rehearsal of aircraft squadrons from the carriers in joint land-

ing exercises with landing craft, troops, and ships, and participation of many pilots and squadron intelligence officers in landing craft and troop maneuvers.

(c) Improved technique from previous lessons learned.

(d) Proper briefing.

(e) Establishment of air support control units to accompany each attack force on the flagship of the commander.

(f) The establishment of coordination with other departments (artillery, naval gunfire, etc.).

(5) That, during the amphibious phase, the assignment of command of all forces in the assault area, including aircraft of all types, to the attack force commander, was sound, and conducive to maximum efficiency.

b. For the first time in the Pacific, the lagoons were swept for mines and used during the early phases of the operation for anchorages by bombardment vessels and by amphibious craft for unloading operations. In addition, destroyers inside the lagoon, in conjunction with destroyers at sea, maintained searchlights on the front lines, at Kwajalein Island, at night. This made the night counterattacks by the enemy in some instances impossible and in others, impotent. At Eniwetok the large scale use of naval star shell was first tried, and proved even more effective than searchlights. This method of illumination was used extensively throughout the remainder of the war.

c. The landing of the divisional artillery on D-day on islands adjacent to the main and heavily defended objectives from which it could support the main landings was a major factor contributing to the success of the operation. The guns were registered early and fired in support of the main assault. The field of fire was not limited and the fire could be massed.

DUKWs were first used by the 7th Division to land 105-mm howitzers and ammunition. The landing of the artillery was facilitated by the use of small cranes, "A" frames, by which the artillery pieces were lifted from the DUKWs at the sites selected for emplacement.

d. A new force was developed, which was named the Underwater Demolition Teams, consisting of qualified swimmers who could go in to the shore line with explosives and blast out any underwater or abovewater obstructions. Commencing at Kwajalein, these teams performed sterling service throughout the rest of the Central Pacific Campaign.

e. Another new operational device was the so-called "Life Guard" service, in which submarines were stationed close to the air strike routes, and in communication with the planes, so that they could go to the rescue of airmen forced down at sea. This was in effect during the Truk strike, when one submarine rescued six pilots. At the time of VJ-day, twenty-two submarines were maintained on this duty, and a total of 585 pilots, Army, Navy and Marine Corps, owe their lives to this fine organization.

f. Above all, the lesson which was demonstrated time and time again throughout the Pacific, and regarding which I have many pleasant personal recollections, was the fact that Army, Navy, Army Air, Marines, and Coast Guard could play together on the same team, each helping to his utmost for the common good. That was really an all-American team, and one of which we all should be very proud.

Military Psychology — Individual Differences

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This is the third in a series of six articles on military psychology by Major Sylvester and Chaplain (Maj.) Longley.—The Editor.

PSYCHOLOGY, like the science of medicine, has been conveniently broken down into specialties which in the former have been called "fields of psychology." Individual Difference is a major division of psychology and is more properly called "Differential Psychology" to distinguish it from abnormal, experimental, educational, and other fields. Broadly speaking, however, differential psychology deals with all of the differences in behavior among individuals and embraces all of the fields indicated above. The established purpose of the study of applied psychology, as it pertains to the military, is a better understanding of human behavior. This is also the fundamental aim of differential psychology. It provides the military commander with a comparative analysis of behavioral development and helps him to understand better why people react as they do.

Individual variation is a characteristic common to all organic life, from its lowest form to man. The pseudo-scientific classifications which attempt to group people into sharply defined categories are qualitative distinctions based on superficial and unscientific observation; these criteria are arbitrary distinctions that society has established and are not supported by experimental research. The adage, "all cats look gray at night" aptly expresses this tendency to disregard differences in mental, physical and emotional capacities. A more intimate inspection reveals that each is quite different from the other.

That individual differences in the broader sense have been recognized for most of the history of man is evidenced in the biological and sociological groupings that have formed the basis for the institutions and customs of modern civilization. Unfortunately, such broad and sweeping group distinctions have frequently resulted in attitudes and social and political institutions which have completely ignored the individual member of the group.

In the previous article, in which the physiological and sociological factors involved in human development were analyzed, it was shown that both heredity and environment were controlling influences. It is also apparent that the causes of individual variation likewise are due to these influences. The dynamics of individual variation likewise are due to these influences. The dynamics of individual differences are far too involved to permit a ready classification of those traits and behavior patterns which are inherited and those which are acquired. The fact that individual differences are quantitative rather than qualitative obviates the concept of types or group classifications.

The Nature of Individual Differences

The student might ask if changes can be brought about in the individual's hereditary makeup through environmental influences: and, further, if such modifica-

tions are controlled by hereditary factors. The previous discussion has touched on this point. Siblings (own brothers or sisters), who demonstrate individual variation offer a good illustration. Although exposed to a similar environment they have evidently inherited different trait characteristics, despite the fact they have a common parentage. Children of the same family brought up in foster homes afford an example of the effects of environmental influences. There may be as much as a twenty-five point difference in IQ between the child brought up in a superior home and his brother brought up in one with substandard levels. Every individual inherits a vastly complex physical organism, not only from his parents, but from preceding generations. It is not surprising then, that varying degrees of skills, aptitudes, and physical traits exist, even among siblings. Certain kinds of twins are an exception. Fraternal twins resemble each other no more than do children born at different times. Identical twins, on the other hand, result from the division of a single ovum, and each has exactly the same number and kinds of trait carriers. They are remarkably alike in intelligence, aptitudes, physical characteristics, and even interests. Different environment, may, however, also result in wide individual differences in such traits.

During the last war, the Army made every effort to keep twin brothers together, an admirable practice in so far as the morale of the twins was concerned. However, in the case of fraternal twins, such a practice often resulted in more harm than good, especially if the assignment was to a service school, such as radio code operating, in which one twin excelled and the other failed due to lack of special abilities, interest and the aptitude involved in learning code operation.

The fact that the genes are the carriers of heredity explains why some children are very much unlike their parents. The germ plasm which constitutes the inherent qualities of a particular family strain are not produced solely by the individual's parents; rather it is transmitted by them, just as their parents in turn transmitted the family strain, and so on for each preceding generation. Each individual inherits traits and characteristics, not only from his parents, but from all of his forebearers. A particular combination of genes can thus produce a trait or characteristic which has been latent for generations or which may never have been in evidence, and, as a result, the child may resemble neither of his parents. This inability of the parent to alter the child's inherent characteristics brings to nought the well-meaning mother's efforts to influence the character or personality of her offspring before it is born by thinking lofty thoughts, reading the world's great literature, or listening to fine music.

The Distribution of Individual Differences

The military commander with a knowledge of individual differences can look objectively at his men. He is far less likely, for example, to fall into a common error of classifying individuals into what has been called the *bi-modal* theory of types. According to this theory, people are divided into two classes with regard to a particular trait; they are thought to be either introverts or extroverts, stupid or brilliant, brave or cowardly, honest or dishonest. The fact is overlooked that individuals actually may differ from one another only in small degrees of these and other traits. Graphically, individual differences can be illustrated by means of a distribution curve. Provided a sufficiently large and representative population is sampled for examination, the results will produce a "normal distribution curve"; that is, it will be symmetrical, having an equal distribution on either side of a vertical line drawn through the center.

In Figure 1 (page 58) is shown the theoretically determined bell-shaped curve

which represents an ideal distribution. Figure 2 is the frequent distribution of scores made by 250 officer students of the Command and General Staff College on an entrance examination. It will be noted that even in this more or less highly selected group, a curve approaching a normal distribution has been obtained. The broken line represents an ideal distribution of scores; the unbroken line is the actual performance of the students. Figure 3 is an example of a bi-modal curve. To construct the curve shown, it was necessary to combine the scores of two highly selected groups, as no data were available based on an actual military example. In other words, if a unit were composed of two selected groups as is indicated a bi-modal curve of this sort would result. Training an organization made up of two such widely divergent groups would tax the most resourceful commander. This does not mean, of course, that an organization composed of individuals in two extreme groups did not exist. The unit commander who found a sharp cleavage in a curve of Army General Classification Test Scores, aptitudes, or skills, would have an unwieldy organization. Such bi-modality would indicate that the average or normal soldier was missing; the commander would have the difficult task of dealing with an above average group on the one hand, and an inferior group on the other.

The curve represented in Figure 1 is uni-modal—a curve having one mode. (A mode is defined as the score which is made by the largest number of individuals in one group.) Most of the individuals cluster near the center of the curve, with decreasing numbers falling on either side of the central tendency of the group. The theory of types, as represented by Figure 3, has it that all of the stupid people cluster at one end of the scale and the geniuses at the other end, with a line sharply dividing the two. In the average organization, however, the military commander can expect to find the superior, the average, and the inferior, in intelligence, ability, skill, interest and emotional quality, with very few Grade I and Grade V men at either end of the scale and the remainder of his organization piled up in the middle, as in Figure 2.

The company or battery commander has the greatest opportunity to recognize the presence of individual differences in the men of his organization. Not only will their records show measurable differences, as indicated by test scores, but he can observe the differences in their performances from day to day. For some men the classification and assignment initially given them may have to be changed. Some skills which have been overlooked will come to light; others will be insufficient to cope with the job. Some men will profit by special training, either on-the-job, or at a service school. Differences in personality adjustment, interests, and the degree of motivation will further complicate the unit commander's task of integrating each soldier into a closely-knit organization.

Much experimentation has shown that the human individual is not superior in all of the traits he possesses, neither is he average nor inferior. True, most of his traits will cluster about the average of the group, but in some trait characteristics he may be above average, and in others he may fall below. The man who is considered mediocre may have variations in his make-up that place him above the average in some particular trait; it may be a trait or aptitude which has never been brought to the surface. This is an important consideration in the assignment of personnel. A soldier may perform a task with indifference, or even fail, if it requires more of him than he is able to give. Whereas he might do well on an assignment that is within his limitations.

The Relationship Between Mental and Physical Traits

The extensive research which has been

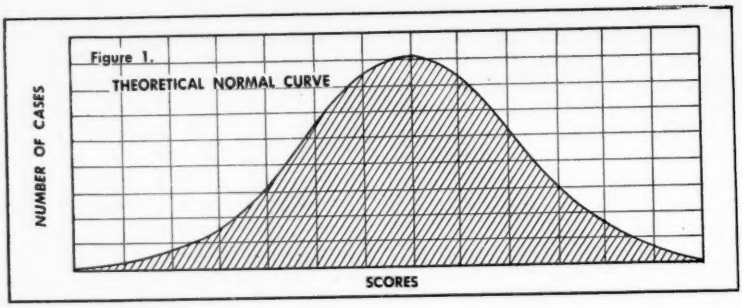


Figure 1.
THEORETICAL NORMAL CURVE
NUMBER OF CASES
SCORES

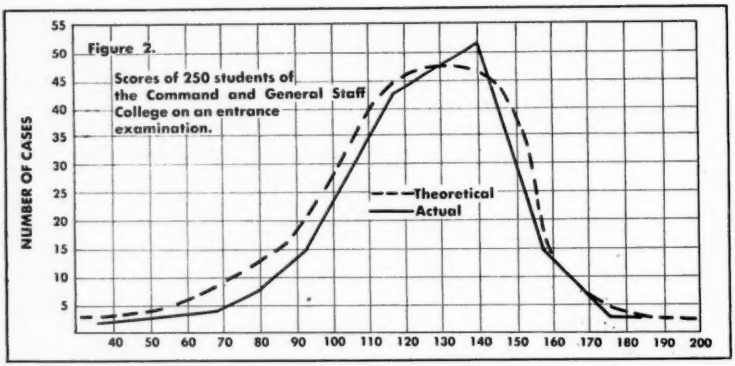


Figure 2.
Scores of 250 students of the Command and General Staff College on an entrance examination.
NUMBER OF CASES
Theoretical
Actual
55
50
45
40
35
30
25
20
15
10
5
40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

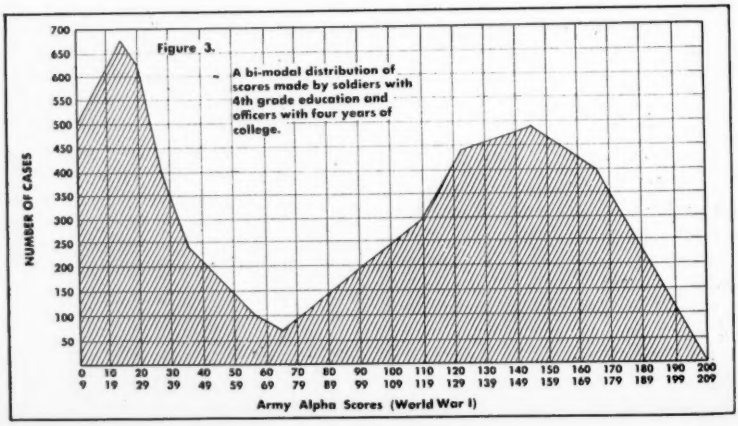


Figure 3.
A bi-modal distribution of scores made by soldiers with 4th grade education and officers with four years of college.
NUMBER OF CASES
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
9 19 29 39 49 59 69 79 89 99 109 119 129 139 149 159 169 179 189 199 209
Army Alpha Scores (World War I)

conducted in the field of differential psychology has thrown considerable light on the type theory which attempts to establish a relationship between the individual's total personality and his physical characteristics. The research conducted and the interpretation of the data obtained is difficult to assess quantitatively due, not only to the inherent complexities which are present in any psychological investigation, but also because of the difficulty of controlling the many variables. Even if all of the subjects selected for an investigation were of the same age, possessed the same general physical characteristics, and were examined under precise conditions, the data would still be open to question due to the extraordinary difficulty of controlling the sociological factors, which are of utmost importance. Individuals of different social strata will not react in a uniform fashion to various stimuli; neither will they possess the same physical concomitants. The soldier who is reared in a home where the standard of living is barely marginal and who has not had the benefits of regular medical attention, high standards of food, or opportunities for intellectual development, will respond quite differently from an individual reared in a superior home. As an isolated experiment, he may provide some data in support of a measurable relationship between mental and physical development. But the correlation will be so low as not to be significant; more importantly, it can hardly be used as a criterion by which other individuals, with totally unrelated backgrounds, can be categorized.

Studies in the relationship between physiognomic characteristics, the size of one's head, or the shape of the body, and the intellectual and emotional endowment of the individual have produced consistently low, or even negative, results. It is difficult to understand how the phrenologist is still able to ply his trade in this enlightened age. It would be most convenient if the "bumps" on one's head were a sure index in the function of the cortical area beneath it. If the surface of the skull followed the convolution of the brain, it would have a marcelled appearance, which would be much more alarming than revealing!

There is much that is traditional in the thinking of individuals which is responsible for their disregard of individual differences. The ascetic-looking person, with a high forehead, thin face, and slight build is thought to be "artistic," or "intellectual." His physical opposite is firmly believed to be dull, slow to learn, and dependable. This type theory employs "stereotypes" to identify behavior patterns with body build and has stimulated considerable interest; but a great deal of research and a critical analysis of the data obtained fails to support it. The correlations obtained were little better than those found in phrenology.

The Interrelationship of Abilities

An interesting discovery brought out in research in the psychology of individual differences is that the traits which an individual possesses apparently go together in clusters and involve a common ability. Intelligence appears to be one of these clusters; so is mechanical ability; athletic skill, and ability to coordinate motor responses are others. Oddly enough, however, the various abilities within each cluster correlate well with each other on a test of that ability, but are relatively independent of those traits which constitute another ability. In other words, a soldier who demonstrates a cluster of abilties in motor mechanics will perform well on any test which measures mechanical ability; but the underlying ability which is responsible for his skill does not appear to extend to the ability to do well in other skills such as using numbers, playing music, or in verbal facility. General intelligence evidently is present in all kinds of ability in varying degrees; but a soldier,

who makes Grade I on the Army General Classification Test and is able to perform complicated mathematical problems, or to speak and write well, cannot be assumed to be equally capable of becoming a radio operator or master mechanic. For example, the Minnesota Mechanical Ability Test and a general intelligence test given to several hundred subjects failed to show a positive correlation; these traits appear to be completely independent of each other.

The Effects of Training on Individual Differences

Of all the aspects of differential psychology which are probably of greatest interest and use to the military commander is the problem of training and variability among soldiers. Even the feeble-minded will improve with training, provided sufficient time is available. Undoubtedly, many men who were discharged from military service for inaptness could have been trained sufficiently to become satisfactory soldiers had there been time; apropos of this class of men, the Army now believes that few of them warranted discharge; they could have been used on such jobs as stevedoring, supply depot, and in general labor battalions, both in the zone of interior and overseas. But the question presents itself regarding the extent of variability or individual differences which exist among a group of trainees. At the completion of basic training, will all of the men be equally skilled? Will the better men progress faster and learn more? Will the same relative standing still exist at the end of a training period?

The exhaustive research which has been made into this problem definitely proves that individual differences will *increase* with practice. The individual who is initially better equipped will learn more with the same amount of training. The commander who believes that he can take any one hundred men in a representative organization and from a given date produce one hundred uniformly trained soldiers will find, if the training can be quantitatively measured by a test, that the results will yield a normal distribution curve. The difference in the amount of information gained will show a very small percentage of well informed and poorly trained soldiers at either end of the scale; the majority will be humped in the middle, with a gradual decline of the curve on either side of the mean. A training schedule must take into consideration the extremes of a normal distribution; selection for schools must likewise be based on a quantitative estimate of the individual's inherent capacity for specialized training as well as his interests and the needs of the Army.

Summary

Individual differences in the human race result from the interaction of heredity and environment. Neither of these factors are, in themselves, responsible for the wide range of differences in the mental, physical, and personality traits which exist among individuals.

Heredity apparently sets up physiological limits beyond which the individual seems unable to progress. The most intensive practice will not improve the performance of the individual of limited capacity beyond a certain level. This inability to improve may even result in a drop in production due to discouragement, boredom, and lack of interest.

Environment appears to be restrictive as well as stimulating in its influence on human development. An individual of mediocre talents cannot be raised to the level of a genius by superior surroundings, nor can the superior individual function above the level of mediocrity if his environment fails to furnish proper motivation.

A well-organized training program will raise the level of proficiency at which an individual functions. It will not, however, remove individual differences, nor

will it materially change the rank of an individual in comparison with others exposed to the same training.

Individual differences are manifested in either sex and in every group, race, and nationality. The notion that any one race is "superior" to all others, such as the Aryan nonsense of Nazi-ism, is untenable psychologically as well as biologically. The effects of conditioning on the behavioral development of the individual are dramatically apparent in an examination of Nazi Germany; no better example could be cited of how thinking and personalities of a whole nation can be molded and guided than was found in the Axis nations. But it was not a uniform process; individual variation was very much in evidence.

It was disastrous on the part of the aggressor nations to think otherwise. The nuances and subtleties of human conduct in all its complex ramifications must be recognized and taken into account, whether the manpower involved is a squad, a division, or the nation itself.

The efficiency of any army depends on many different things, but one is outstanding—and that is morale. You can have all the material in the world, but without morale it is largely ineffective. You must have morale first and foremost, and morale is determined by a great many things. Primarily it depends, of course, on leadership, on the possession of equipment, and in the long run—on the people back home.

General of the Army George C. Marshall

Teaching Military History

Colonel M. E. Barker, *Chemical Corps*
Commandant, Chemical Corps School

IT was considered desirable at the Chemical Corps School that students in the advanced course should study history as a guide to the future. Furthermore, we wanted the students to understand the correlation between scientific discoveries, industrial progress, social and political organization, arms development, and changes in military technique so they would be able to forecast such changes in the future, based upon current changes in all these fields. Also, we wanted to teach our students how to spot industrial procedures and inventions that could be applied to the military art. Therefore, our military history course was tied to the study of matériel, physics, and chemistry on one boundary; and tactics and technique of combined arms on the other. Future developments were considered under the atomic era as a separate subject.

We decided that about 200 hours of classroom time could be devoted to the group of subjects comprising "The Military History of the United States" and broke this allotted time into the following subheads in the order of the beginning of their presentation, viz: *a.* Preparation of documented reports and the use of a library for historical research, forty hours; *b.* Assignment and conferences on the preparation of an historical monograph, ten hours; *c.* Classroom lecture periods, seminars, and examinations on American history proper, eighty hours; *d.* New developments, ten hours; *e.* Library research and preparation of an historical monograph, forty hours; *f.* Presentation and defense of the assigned monograph, twenty hours. We believed, and still do, that this system of instruction offers the maximum development of the mature student and will give him the skill both to study and to write history in an effective manner.

This method of study develops some skill in projecting the historical curve through the fog of the present into the unknown space of the future and, after all, this was our main objective.

For our classroom work proper we broke the history of the United States into ten eras as follows: *a.* The colonial period (up to 1776); *b.* The revolutionary period (1776-1800); *c.* The period of great expansion and invention (1800-1860); *d.* The War between the States (1860-1870); *e.* The winning of the west (1870-1900); *f.* The development of big business (1900-1917); *g.* World War I (1917-1920); *h.* The Modern Industrial Age (1920-1941); *i.* World War II (1941-1945); *j.* The Early Atomic Age (1945-?).

We studied each era in succession, covering in separate lectures and conferences the following phases, viz: *a.* Political and social organization of the times; *b.* Economic history and major commercial inventions of the era; *c.* Development of arms and weapons; *d.* Military organization and technique; *e.* Typical military operations of the USA during the period; *f.* Seminar and review of

the era to correlate the effect of the various factors upon military technique.

By covering each subject in each of the first nine eras in a one-hour period, except typical military operations, we were able to devote some forty hours to a study of military operations. This gave us one hour in six of the eras, eight hours for the War between the States, six hours for World War I, and twenty hours for World War II.

Having prepared a very ambitious plan for our history course, the next problem was to select text books and to arrange references that could be covered in the time available to the students for study which would give the students the broad and unbiased perspective we hoped they would acquire. This task proved to be especially difficult since history seems to have been studied and written heretofore in nearly airtight compartments. For instance, nowhere that I know of can you find much thought given to the effect of such things as the invention of Fulton's steamboat on military technique; but how could a modern amphibious operation be carried out without this invention? Or consider again the tremendous importance of the perfection of Forsyth's percussion primer patented in 1807 in England, and perfected by Shaw in the USA in 1816, upon development of subsequent military equipment; or the powerful effect of Houiller's patent, in France in 1846, on the metallic cartridge and its perfection by Morse in the USA and Bordan in France between 1858 and 1870. The perfection of the metallic cartridge depended upon the perfection of machines to draw brass tubes for the cartridge cases. Again consider where our modern lavish use of ammunition and material would be in the absence of automatic screw machines for parts manufacture and nitrogen fixation for the production of synthetic ammonia for explosive. It is this interdependence of a multitude of interlacing inventions, new techniques, and new procedures that we wanted to emphasize.

As an example, in Ganoe's "The History of the United States Army" the first mention of percussion caps occurs with reference to the supply of one million of these in the Mexican War (1848). As a matter of fact, the Army was still using a lot of flint-lock muskets as late as 1855, when repeating rifles, using rimfire metallic cartridge, were in existence. This shows the lack of progress characteristic of the Army in times past which we must guard against now and in the future by training our officers to recognize industrial improvements and adapt them promptly to military use. This was another object of this method of teaching military history.

There was no text for the kind of history we wanted to teach, so we adopted the plan of multiple texts with added references and divided the class into study pairs, assigning one member in each pair who had predominantly military training and experience, while the second member had been trained in science or industry. As a text in economic history, we adopted Faulkner's "American Economic History (fifth edition)" with Glover and Cornell's "The Development of American Industries" as a reference text. For political and social history we selected Beard's "The Rise of American Civilization" as the standard text, with Adams' famous picture history "The Album of American History" as the reference text. Numerous additional references for volunteer study were given the students, but the extra reading was not required on economic and political phases of the history course.

Military weapons, equipment, technique, organization, and military operations were covered in illustrated lectures, often supplemented by showing the actual material; by motion pictures; and by library references. New developments were covered by lectures and illustrations of a classified nature and assigned reading. The

maximum use was made of references containing considerable illustrated material, and books of pictures, as a quick and accurate means of the students acquiring the information and ideas needed.

We now had what we felt was a new and worth-while approach to the study of American military history. All that remained to be done was to secure instructors who knew their specialties and who could be organized into an effective team. For military operations in World Wars I and II, we secured several guest speakers who could say "This is the way we did it"; then used regular members of the faculty to fill in the details. We called on two of our best civilian historical writers for much of the formal history instruction. Since both of these gentlemen had been college professors, one specializing in economic history and one in political history, we found their help invaluable. A reserve officer who had taken his Ph.D. in American History was persuaded to return to active duty, and he was placed in charge of library research, preparation of monographs, and the seminar discussions. Members of the technical instruction staff prepared and presented the periods in weapons improvements and invention in the various eras, and new developments. The instructor training group took over the job of teaching public speaking and applying this to the presentation of the monograph, dividing the class into small sections for these presentations, except for two or three outstanding monographs which were selected and which would be presented to the full class and faculty.

In covering actual military operations, the history teachers cooperated closely with the tactical instructors in selecting a broad, general coverage wherein both the good and the bad points of various campaigns were emphasized without infringing on tactical instruction. That meant that we had to cover the African campaign in two hours, one devoted to the landings of the Eastern and Western Task Forces, and the other one devoted to the Tunisian campaign. Likewise Italy had to be covered in two periods. ETO ground and supply operations were allotted three hours with two added for Air Force operations—one for strategic bombing and one for tactical support.

Then there were the two wars in the Pacific: the one waged by MacArthur from Australia to the Philippines, and the one waged by Nimitz from Hawaii to Okinawa. The combined Army-Navy-Air decisive Battle of Okinawa was emphasized. We were fortunate in having a naval staff member who had participated in the "Atlantic war on the submarine," and in most of the naval battles of the Pacific, to present these subjects. The heart-breaking Battle of Bataan was presented by a staff member who went through it all.

We were extremely fortunate in getting the services of some twenty different people to present this course in history. The effort of organizing, coordinating, and executing the plan was tremendous, but all of us who participated (including the students) feel that we have found a very effective approach to the problem of teaching military history, and as a by-product our students really understand American history for the first time in their lives.

MILITARY NOTES AROUND THE WORLD

NORWAY

Modern Defense

In an effort to organize a modern defense system, the Norwegian Defense Department has worked out a plan for Parliament. Under this plan, the national defense system will be augmented, with aviation, antiaircraft artillery, rocket production and atomic energy research given special attention.

The Army will receive 110 million kronen, the navy 100 million, aviation 38, coast and antiaircraft artillery each 10, rocket production and atomic research each 5, and the medical service 2 million kronen. It is also learned that a new type of rifle is being developed for the Army and will be ready in a few months.

Special emphasis is given by the Defense Department to production of rocket weapons. Besides production of foreign types, rocket weapons of Norwegian design, better adapted to the peculiar requirements of Norwegian defense, are being developed. In atomic research, the Norwegians are also considering construction of a uranium bomb for experimental purposes.—*Allgemeine Schweizerische Militärzeitung* (Switzerland).

FRANCE

Airborne Division

The French minister of war recently reported that the first French airborne division was ready for service. The equipment of this division was mainly manufactured in France.—*Flugwehr und -Technik.*

CANADA

Uranium Deposits

New uranium deposits have been discovered in northern Canada, according to the Canadian Reconstruction Minister. The new discovery, however, will not alter Canada's position as the second largest supplier of uranium, with the Belgian Congo still leading the world. Canada now has in operation an atomic energy pile of sufficient capacity to supply her present needs of isotopes for medical science.—*Associated Press.*

SWITZERLAND

Reorganization

The Swiss Air Observation and Message Communication Service has been reorganized by the Supreme Executive Council, to create a staff, four zones, nine sectors, and nineteen companies.—*Flugwehr und -Technik.*

TURKEY

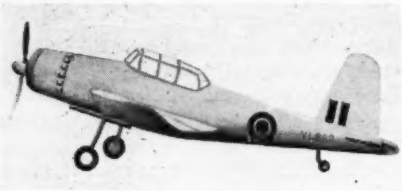
Naval Visit

Seven ships of the United States Naval Forces, Mediterranean, made an informal six-day visit during September at Izmir, Turkey. The governor of the province, the mayor of Izmir, and the Turkish people extended an enthusiastic welcome and hospitality to the officers and men. It was estimated that 20,000 persons visited the ships, which included the aircraft carrier *Leyte*, the light cruiser *Dayton*, the destroyers *Stormes*, *Massey*, *Owens* and *Henley*, and the destroyer tender *Yellowstone*.—*Army and Navy Register.*

GREAT BRITAIN

British Jet Trainer

The first British jet trainer is the Boulton Paul prototype P.108. When in production, it will be called the Balliol and fitted with a Rolls-Royce Dart or Armstrong Siddeley Mamba turbine. Although its primary purpose is to instruct pupils in the operation of the airscrew



turbine engine, the craft is also suitable for instruction by day or night in gunnery, navigation, bombing, or glider towing, and can be adapted for deck-landing training. It is a three-seater plane, with all-metal construction.—*The Aeroplane.*

Surplus Military Aircraft

Four hundred aircraft of all types, including trainers, were sold to Turkey in 1946. There was then no other applicant for the aircraft, but sales of surplus military aircraft have also been made to Belgium, Czechoslovakia, Denmark, Eire, France, Greece, Holland, Norway, Persia, Portugal and Sweden.—*The Aeroplane.*

Jet Seaplane Fighter

Britain's first jet-propelled seaplane fighter, the Saunders-Roe A1, has completed its first public tests. The plane mounts four 20-mm cannon in the nose and is powered by Metropolitan-Vickers jet units. The cabin is pressurized for high altitude flying. The maximum speed of the plane has not been announced.—*Associated Press.*

EGYPT

Military Mission

Reports that the Egyptian Premier would ask the United States to send a military mission to Egypt to help modernize the army are said to have been well received in Cairo. For some time there have been various proposals in Egypt to enlarge the army, implement the conscription laws, generally strengthen the military defense, and prepare for construction of munitions factories. Early in 1947 an Egyptian military mission toured the United States and returned home greatly impressed with the training program, military organization, and various weapons observed at that time.—*The New York Times.*

GERMANY

Uranium Mining

Small amounts of uranium are being produced in Soviet-controlled mines in the region of Marienberg, Germany, according to reports from Berlin. It was estimated that 1,200 men are working in the Marienberg mines, 4,000 at Schneeberg, 3,000 at Johann Georgenstadt, and, 2,000 at Ennaberg. The mines around Marienberg were opened originally about 1934, to mine silver, cobalt or bismuth. Mining operations for uranium were reported to have started in the summer of 1946.—*Associated Press.*

INDIA

Division of Air Force

India will have eight, and Pakistan two, of the ten squadrons of the Royal Indian Air Force. This division is based on the ratio of Moslem and non-Moslem personnel of the Air Force.

A third squadron may be created for Pakistan out of spare planes at the disposal of India, although it is not certain whether Pakistan will have the necessary personnel.—*The Aeroplane.*

USSR

Russian Partisans

The Russian periodical, *Ogonyok*, recently published a secret German map which had fallen into the hands of the Red Army. It gives a good picture of the military activities of the Russian partisans and their effect on the rear lines of the German Army.

The map was from the headquarters of a German unit protecting lines of communication and the movement of supplies behind the front. The map was captured by a White Russian partisan unit which was engaged against the SS troops of General von Schinkendorf back of the so-called "Zentrum" army group.

Numerous marks scattered over the map indicated the partisan activities during August 1943. During that month, in the five operational areas shown, 719 fights with the Germans occurred, 831 enemy garrisons were attacked, telephone and telegraph lines were cut in seventy places, seventeen German officials were rendered "harmless," eighty-two bridges destroyed, and the main lines of the German railway system blown up in 6,000 places.

In spite of this, the Germans did not know the full extent of the partisan movement. Judging by the map, information was very meager concerning location of the partisan bases. Although there were thousands of such bases, only fifteen were known to the German headquarters. The information possessed by the Germans relative to the movements of the partisans formations and brigades was still more incomplete. In August 1943, several formations were moved from the western to the eastern part in White Russia. These movements were not shown on the map. And still less known was the location of flying fields used by the partisans. This indicates that the populace was in league with the partisans, and faithfully supported and protected them.

In August 1943, the partisans made mass attacks on enemy communication lines. German railway lines were blown up in 120,800 places.

Attack on German railway lines by partisan forces of White Russia resulted in a forty per cent reduction in German transportation in August and September 1943.

A further mass attack on enemy communications occurred in October and November, 1943, and in June 1944, immediately before the liberation of White Russia. By blowing up railroad tracks in 47,000 places, all traffic was halted on the main Russian lines.—*Allgemeine Schweizerische Militärzeitung* (Switzerland).

Russian Helicopter

A Russian helicopter of unusual design is this Bratukhin Omega two-seat craft,

which is used for research purposes.—*The Aeroplane Spotter.*

400-Mile Russian Rocket

A guided missile with a 400-mile range, twice that of the V-2s, is in the hands of Soviet Russia. The missile was developed by the Germans and captured by the Russians at Peenemünde. The U. S. has plans and specifications for the rocket, known as the A-9, but no working model. The rocket is similar to the V-2 but has wings that double the range.

Special control devices give it at least as much accuracy as the V-2.—*Infantry Journal.*

AUSTRALIA

Conference on Japan

The preliminary British Commonwealth conference on the Japanese peace settlement, which met recently in Camberra, agreed that Japan should be completely disarmed and demilitarized. It was also agreed by the delegates that internal order in Japan should be maintained by a non-military police force, that no atomic research be permitted, and that manufacture of aircraft and naval vessels be completely prohibited.—*Australian News Summary.*

Antarctic Exploration

Australian plans for Antarctic exploration this winter include an expedition composed of three sections. One group will conduct a search for the site of a permanent base somewhere near the south magnetic pole. Another section will completely map Heard Island, which is near Kerguelen Land about 2,000 miles southwest of the southwest tip of Australia and will remain there about fifteen months carrying out meterological and cosmic ray research. Another section will do similar research work on Macquarie Island, 800 miles southwest of Tasmania, remaining for about a year. The expedition is a part of the Australian Government's plan to scientifically investigate the Antarctic during the next five years.—*Australian News Summary.*

Pilot Training

Approximately eighty Australian pilots will go to England early in 1948 for a course in naval aviation, the first pilots to be enlisted and trained for Australia's two new aircraft carriers. The two carriers will be the *Majestic* class, cost between $9,750,000 and $12,000,000, displace 18,000 tons, and carry thirty-six planes each.—*Australian News Summary.*

Citizen Military Forces

The Australian Citizens Military Forces will be inaugurated on 1 July 1948. Recruited on a volunteer basis, the citizen forces will have a strength of 50,000.—*Australian Weekly Review.*

MEXICO

Cadets in Ceremonies

Cadet delegations from sixteen nations in the Western Hemisphere participated recently in the centennial celebration of the defense of Chapultepec. Among the cadet delegations attending the ceremonies at the invitation of President Alemán were five cadets from the United States Military Academy at West Point.

The ceremonies furnished another opportunity for the expression of Inter-American solidarity. Later, the cadets attended the Mexican Independence parade on 16 September. Plans were made for a group of cadets from the Colegio Militar to return the visit at West Point.—News reports.

CHILE

U.S. Submarines

Three United States submarines, the *Conger*, *Cutlass* and *Diablo*, visited Valparaiso after a trip around Cape Horn to participate in Chilean Independence Day on 18 September.—*Armed Forces.*

PERU

Purchase of Equipment

Naval vessels and military equipment recently purchased by Peru from the United States include a patrol frigate, two ocean tugs, two minesweepers, twenty-one torpedoes and fifteen torpedo heads for maneuvers, and four land tanks. Thirty-five officers and 263 men were sent to the United States on the war transport *Callao* to sail the vessels back to Peru.—*The New York Times.*

UNITED STATES

Optiphone

The Optiphone, a device which permits telephone communication over a narrow beam of white or dark red light, was recently revealed by the Signal Corps.

Developed by the Signal Corps Engineering Laboratories, it was used successfully toward the end of World War II by the Third Army. It was designed for point-to-point communication where laying of wire lines was impractical or radio silence necessary.

The Optiphone provides single-channel, two-way, break-in speech communication and consists of an optical unit, a control unit, a storage battery, and a field telephone. The complete unit weighs 145 pounds. Optical range is up to four miles during daylight and up to seven miles at night with dark red filter. The field telephone is used directly with the equipment for point-to-point communication.—War Department.

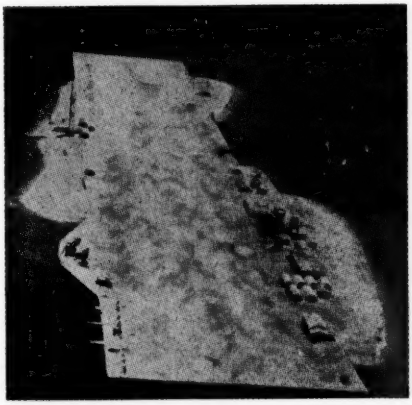
Curtiss XP-87

The AAF's newest fighter airplane, the Curtiss XP-87, is the first fighter powered

by four jet engines. The plane is operated by a two-man crew, and is designed for the most extreme weather conditions.—AAF photo.

Stationary Aircraft Carrier

Building an airfield without the land on which to build it was one of the unusual accomplishments in the Pacific in World War II. The airfield was built on French Frigate Shoals, 552 miles northwest of Honolulu.



Stationary aircraft carrier at French Frigate Shoals, built to protect Midway.

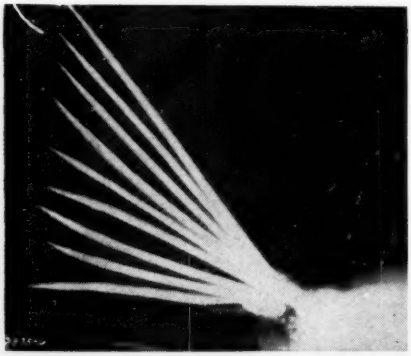
French Frigate Shoals is a reef eighteen miles long and two or three miles wide. The Navy's decision to build an airfield there was a direct result of the Battle of Midway, to provide a base for fighter planes close enough to support Midway.

Starting with a sand spit no larger than a tennis court, Navy Seabees dredged up enough coral to build a stationary aircraft carrier, 3,100 feet long and 250 feet wide. The cost was $1,800,000.

As the war moved further west, the importance of the island field decreased, but it was used as an outpost defense for Pearl Harbor. The field is now under the jurisdiction of Hawaii.—*The Military Engineer.*

Rocket Launcher

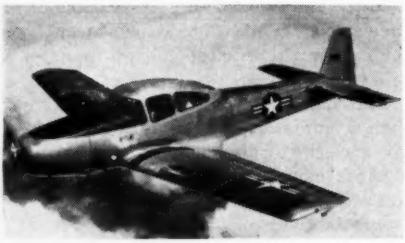
Tests have been made at the Ordnance Department's Aberdeen Proving Ground of a 4.5-inch rocket launcher. The barrage effect produced at night by firing nine



rockets at half-second intervals is shown here. The light-weight launcher used is hidden by glare, but a similar launcher, called the "Xylophone," is shown in the foreground.—Signal Corps photo.

Liaison Plane

Eighty-three L-17s have been ordered by the Air Force for the Army Ground

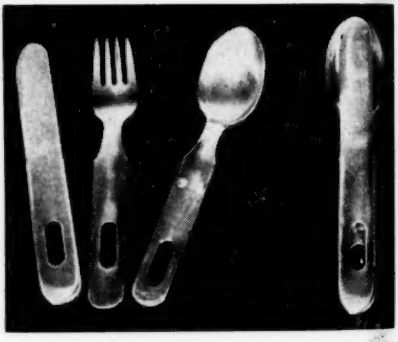


Forces and the National Guard for liaison and general communications. The plane is the four-place NAvion in military dress.—AAF photo.

New Mess Unit

The Army is testing an improved type of knife, fork and spoon made of stainless steel and capable of being nested and carried in a uniform pocket.

Experience in World War II showed that the present knife, fork and spoon are bulky, and rattle when carried inside a mess kit. Each of the new implements is made of a single piece of corrosion-resistant steel with a slot near the handle which permits it to be strung on the handle of the mess kit for washing and sterilizing.



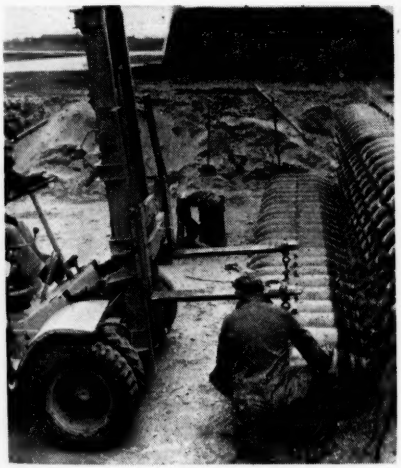
The knife, fork and spoon of the new mess unit are shown above; on the right are the same pieces nested together.

The Germans developed a nesting fork and spoon, one type being hinged together with a rivet and the other snapped together by means of two slots and two rivets. The British had a nesting unit held together by a hinged clasp on the handle. The new Quartermaster-designed unit is considered to be an improvement over all others since there are no rivets or hinges to present difficulties in sterilization.—Office of the Quartermaster General.

Experimental Ammunition Storage

Due to the shortage of magazine storage space for the large quantities of ammunition now on hand in the United States, the Army Ordnance Department has developed a process of burying live bombs in order to preserve them.

Although the project, known as operation "Buried Alive," is still in the experimental stage, Ordnance personnel feel that the idea might be developed to a highly successful stage with savings in the cost of storage.

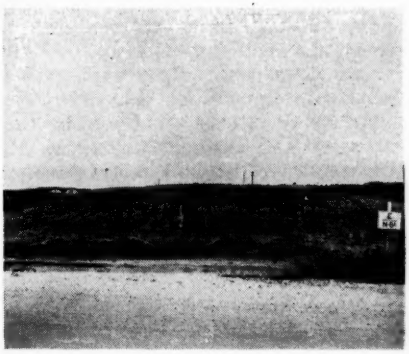


Processed bombs being stacked prior to covering with earth.

Current methods of storing bombs include use of igloo magazines and outdoor barricaded sites. As a result of the new method, however, it is believed that storage space for 200,000 tons can be created by stacking the bombs, covering them with earth, topping with soil, and covering with black-top.

It is believed that the ammunition will be safely stored and costly surveillance and maintenance factors eliminated. The experiment is being made at the Savanna Ordnance Depot in Illinois.—Signal Corps photos.

A power shovel placing earth over bombs. Igloo magazine in background.



Completed site, after soil has been piled in place.

Miscellaneous Notes

Indian Scouts

The last four members of the Indian Scouts of the Army have been retired from the service at Fort Huachuca, Arizona, bringing to an end an organization which performed memorable duty in the Indian wars after its establishment in 1866.—News reports.

Army History

The first volume of a comprehensive and authoritative series of histories of the Army's performance in World War II has been released by the War Department under the title, *The United States Army in World War II; The Organization of Ground Troops.*—War Department.

Exercise "Yukon"

The army is holding arctic training and testing exercises this winter at Big Delta, Alaska, 100 miles southeast of Fairbanks. The exercises began 1 November and are scheduled to continue until 1 March. They are being held to develop air transportability methods for the arctic, to evolve training and indoctrination procedures for ground force units in arctic operations, and to make observations and prepare records that will furnish a basis for the further development of doctrine, tactics, techniques, organization and equipment for arctic operations. Four training elements, each consisting of an augmented rifle company of the 2d Infantry Division, are rotating in carrying out Exercise "Yukon."—Department of the Army.

TNT for Rifles

A United States patent has been granted on a new method for making rifle powder which produces a propellant in which violent explosives such as TNT can be safely used for boosting bullet speeds to higher levels.—*Science Digest.*

"A" Reserve Units

Approval for the expansion of the first four ground and service type units of the Organized Reserve Corps to Class "A" organizational status has been granted by the War Department. All of the first approved units are located in Pittsburgh and assigned to the Second Army.

Expansion of these units to the Class "A" level, which means that they have at least 80 per cent of their authorized commissioned personnel and 40 per cent of their authorized enlisted strength, marks a major step in implementation of the Army Ground Forces program for peacetime development of an adequately organized and trained civilian reserve force.

Begun in 1946, the new reserve program calls for organization of 8,364 units of the ground combat arms and administrative and technical services, varying in size from platoons or detachments to divisions. So far, 5,686 of the units under tables of organization and equipment have been activated. Most of the latter exist as Class "C" units, with officers only assigned. Approximately 262 have qualified for Class "B" status, with both officers and key noncommissioned officer personnel assigned. Not all of the 8,364 reserve units are intended to reach full "A" status.

Authorization of the Class "A" units marks the first time in the history of the United States Army that there have been Organized Reserve Corps units up to strength in both officer and enlisted men. Prior to World War II, reserve units existed with officer strength only.—War Department.

Scrap Metal

The War Department expects to obtain 500,000 tons of critically short iron and steel metal by July 1948, principally by demilitarization of old ammunition.—War Department.

FOREIGN MILITARY DIGESTS

The Role of Supreme Commanders

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel G. A. Rowan-Robinson in "The Fighting Forces" (Great Britain) June 1947.

IT is an interesting study to compare the way in which the role of Supreme Allied Commander was first conceived and then carried out in the two great wars of this country. The scope of this article is the consideration in general terms only of the principal points of comparison. It is proposed, therefore, to treat the subject under three heads; to consider, first, the circumstances in each war in which the role of Supreme Commander was created; second, how it was conceived; and third, how it was actually carried out in World War I by Marshal Foch and in World War II by General Eisenhower.

In World War I the need for a Supreme Allied Commander was apparent to a few of those in high places on both sides of the Channel, even in the early stages of the war. But the arguments against the creation of such an appointment were for a long time too strong, particularly in Great Britain. It was felt that the effect on the morale of both the British public and the British Army, were a Frenchman to be put in over-all command, would be so adverse as to make such a proposition virtually out of the question. Moreover, from a purely administrative point of view, the necessity did not arise. Both armies had their own separate bases and lines of communication, and were thus self-supporting in every respect. But as the war progressed, the need for some supreme authority to settle plans and allocate reserves became increasingly apparent.

The first solution was the setting up of the Supreme War Council at Versailles, which was embodied in the Pact of Rapallo and was precipitated into being in September 1917, by the disaster of Caporetto and the need for reinforcing that front quickly. It consisted of the Prime Minister, one other Minister, and a military representative from each country. From the very outset, the members of this organization of inter-Allied control displayed all the symptoms of mutual distrust and suspicion which it was so important should be discarded if Allied solidarity was to be achieved. Then in February 1918, the Executive Board was created. This was, in fact, merely an offshoot of the Supreme War Council and was composed simply of the military representatives of the latter, save that for France, Foch replaced Weygand. On the suggestion of the American representative this Board was given executive powers, and Foch was appointed its chairman. This rule by committee, however, soon proved itself incapable of dealing with the divergent views of the French and British Commanders in Chief, and virtually fell on the question of the allocation of reserves for 1918, when Haig refused to ac-

cept the decision of the Board. Seven days later, on 21 March, the great German offensive opened. It was only then, when the Allies stood on the brink of a major disaster, that they were able to cast aside their national prejudices and personal jealousies and create at last, under the Beauvais Agreement, the appointment of what amounted to a Supreme Allied Commander.

When we turn to consider what happened in World War II, it is clear that the lessons learned in 1918 were not forgotten. Within a month of the entry of the United States into the war the inter-Allied (Anglo-American) organ for over-all control of the war—the Combined Chiefs of Staff—was created and set up in Washington. Under it the naval, military and air forces of the two nations were pooled and could be allocated to any theater of operations. In contrast to the intrigues and bickerings of the Versailles Council, the Combined Chiefs of Staff worked with a truly amazing smoothness and efficiency from the very start. General Marshall, in his second biennial report (1941-43), wrote of it: "Probably no other Allied action, in the field or otherwise, has exerted as powerful an effect on the conduct of the war as this prompt establishment of a prescribed procedure for achieving unity." The position was, of course, an easier one in many ways than that of 1918. For one thing, there was no language barrier as there had been at Versailles; furthermore, the British temperament, though differing in many respects from the American, is more akin to it than it is to the French.

The natural corollary of the formation of the Combined Chiefs of Staff was the appointment of a Supreme Allied Commander in each theater of operations. In fact, even before the first meeting of the British and American leaders had ended, General Wavell, then Commander in Chief in India, was appointed Supreme Commander of all American, British, Australian and Dutch forces in the Far East. Thus by the time the stage was set for the final European campaign in 1944, the system of a united Allied command was already a well-tried one. Whereas in the 1914-18 war we were almost living from day to day in questions of Allied command, and crisis followed crisis until the final solution was only forced upon us by the greatness of the emergency, in this last war we established at the very start a machinery which was to stand the test of every storm. There may, at times, have been disagreement as to whether the Supreme Commander in any particular theater should be British or American—and feelings in political circles in both countries occasionally rose high on such counts; but once the appointment was made both countries did their best to insure that the commander in question received their whole-hearted support.

We now come to analyze the conception of the role of Supreme Commander in the two wars. Under the Beauvais Agreement, Foch was appointed "to *coordinate* the action of the British, French and American Armies on the Western Front." At the same time he was given the "strategic direction" of military operations, leaving the "tactical direction" of their armies to the three national Commanders in Chief under him. Moreover, each Commander in Chief was allowed the right of appeal to his own Government if, in his opinion, his army was placed in danger by an order received from Foch. Foch himself felt that this formula gave him no authority for seeing that his orders were carried out; and so, a few weeks later, he succeeded in securing for himself the title of "Commander in Chief of the Allied Armies in France."

In order to carry out this assignment he had a staff considerably smaller than that of a brigade. It consisted merely of his Chief of Staff, Weygand, and two or three personal aides. From time to time he would issue a directive from this

headquarters, giving in broad outline plans for coming operations, or a memorandum setting out his view of the situation and what action he considered necessary; or more often, it would be a short message spurring on some subordinate to more vigorous action. But he himself spent a large amount of time visiting his commanders in the field. This conception of the role was not entirely his own; for he still felt that he had not been given sufficient power over his subordinates. But he recognized the fact that he could not really hope for more in the circumstances.

In World War II the conception of the role of Supreme Commander was developed with much greater care and precision. For one thing there was much more time to study and plan; moreover, it soon became clear that the nature and complexity of the operations which he would command would make it necessary to give him much wider powers than those accorded to Foch. It was in the summer of 1942, as part of the preparation for the North African expedition that the basic pattern for Allied command was formulated, which was, with but few alterations, to be the standard one for all subsequent operations. Eisenhower, who had the chief part in molding and defining this pattern, insisted that all the national forces should be integrated into his command, and that the right of appeal to their Governments, which they had had in the last war under the Beauvais Agreement, should be exercised only in extreme circumstances, and only provided that the time required for this appeal did not entail missing an opportunity to make progress, or endangering any part of the Allied force. The proper channel of command was from the Combined Chiefs of Staff to the Allied Commanders in Chief, and on to each of the Task Force Commanders or (as in later operations) the naval, ground and air commanders.

It is now time to consider how the two Supreme Commanders respectively carried out the roles assigned to them. Both had been, by dint of their past careers, well qualified for the job. Foch had already held several high commands in the field during the war, including that of an army group; and as coordinator of the British and French fronts at the First Battle of Ypres he had tackled with success some of the problems with which he would have to deal on a larger scale as Supreme Commander. But by 1918 he was sixty-six years old. As early as 1916, after the Somme offensives, he was being referred to as "a once great soldier who was but a shadow of his old self." And between then and 1918 he had been out of favor for a considerable period, and for a time virtually unemployed. Nevertheless, when things began to look their blackest in March, 1918, his was the voice which more than all others rose above the clamor of despair and pessimism and proclaimed his faith in the ability of the Allies to force a victory out of the very jaws of defeat. It was as if the very magnitude of the emergency had given him renewed youth and vigor. Several other names had previously been suggested as possible Generalissimos, but on that fateful afternoon at Doullens there was complete unanimity that Foch was the only man for the job.

If one were to sketch the graph of Foch's career up to this point it would appear as a very irregular line of ups and downs, rising or descending sharply at infrequent intervals. Eisenhower's graph, on the other hand, would be an almost uninterrupted straight line rising steadily from beginning to end. Although lacking active service experience in World War I, he was, as early as 1922, a marked man after his association with General Connor; and from 1925, when he passed out first from the Command and Staff School, he went forth from one suc-

cess to another. Moreover, nearly all his appointments would seem to have been chosen by a far-seeing Providence as the best preparation for a future Allied Commander in Chief. He got experience of almost every type of military problem of a higher staff nature. He was, too, fortunate enough to spend considerable time working under such brilliant mentors as MacArthur and Marshall. Even so, in 1941, when America entered the war, he was still comparatively junior on the list of generals, and his appointment to England in 1942 to lead the North African expedition entailed promoting him above the heads of many.

This contrast in the rise of the two Commanders in Chief to their respective jobs is in many ways reflected in their characters, and is thus, in a sense, characteristic of the way they interpreted their jobs. Foch was a man who was both deeply religious and ardently patriotic. His memories of the Franco-Russian War, when he had witnessed the German occupation of Nancy, had filled him with a burning passion for revenge, and his whole life was thereafter dedicated to that end. At first sight he might not perhaps strike one as the ideal type for securing the maximum of cooperation between allies. He had a quick temper, could be, and often was, extremely outspoken, and had very strong ideas of his own, which were not infrequently opposed to those of his subordinates. As against this, however, he had a certain flair for diplomacy (the more cynical might consider "intrigue" a more apposite word) and a sense of humor which, though invisible to many, nevertheless existed. But his outstanding asset was his capacity for inspiring others with his own confidence, determination and fighting spirit. As a source of inspiration both to the troops and to subordinate commanders he was unsurpassed. Although he had been given strategic, as opposed to tactical, direction of the war, and had declared at the Beauvais Conference that the borderline between strategy and tactics was quite clearly defined in his mind, he nevertheless often transgressed it when it suited him, and was not infrequently to be found running his subordinates' battles for them, for by dint of the fact that he had virtually no staff of his own, he was in many ways a fairly free agent. With problems of administration he had little concern or even interest.

Eisenhower's position in this respect was very different. The amphibious nature of so many of the operations and the great increase in the importance of the air arm made it imperative that they should be coordinated and directed by a single head. Eisenhower thus assumed command of all three Services. But in addition to this (which included the control of the whole administrative machine) he had to deal with such matters as relations with the press, political and psychological warfare, censorship, security, control of occupied territories, and—what he had made his particular concern—relations between the Allies. It was not surprising, therefore, that the size of his staff at SHAEF was such that the largest palace in the world would not have housed it. No staff, however, could take the weight of responsibility for all these matters from off his shoulders; he had to have a firm grasp of them all and frequently be prepared to give snap decisions about any one of them. But even this was not all. In addition to these purely professional and intellectual qualities he was required to have an almost inexhaustible fund of patience and tact, a tremendous power of self-control, and a tirelessness without which no man could have lasted in the job for more than a few months. All these qualities Eisenhower possessed, and on top of them all he superimposed the charm of his delightfully frank and honest personality.

Only two serious criticisms were levelled against him or his system of command in the course of his three years in command of AFHQ and SHAEF. The first was the question of political responsibility which arose during the North African campaign. The full political responsibility that an Allied Commander in Chief would have was certainly appreciated in the summer of 1942, during the planning phase of the expedition. Eisenhower was given a political adviser (Murphy) whose job it was to report back direct to the State Department, and who frequently acted without either consulting or informing Eisenhower. Yet it was the latter who had to bear the blame for the political chaos which ensued during the first months after our landings in North Africa. The weakness in organization was never wholly rectified. Eisenhower continued to have his American and British political advisers representing the State Department and Foreign Office respectively, both of which often failed to take sufficient account of the question of military expediency. A partial solution to the problem was found in the latter part of the war, when Civil Affairs, Psychological Warfare and Public Relations were all embodied as integral parts of the SHAEF Staff. But, of course, this did not cover all the aspects of the political adviser's work.

The other matter which gave rise to criticism was the question of the command of ground troops. As Supreme Commander in the Mediterranean, Eisenhower had had under him a separate commander for the ground, sea and air forces, first during the Tunisian campaign, then in Sicily, and finally in Italy. But when he came back to assume command of SHAEF he decided to take over himself, after the assault phase, the command of all ground troops, thus giving himself a dual role. This had the advantage that it got rid of one whole headquarters and shortened the chain of command. Moreover, it afforded Eisenhower the opportunity of exerting a personal influence over the operations and over his commanders in the field, which he felt to be the true role of a supreme commander. Finally, he realized that it would have been difficult, if not impossible, to find a separate ground force commander who would have been acceptable to both British and Americans. As against this, however, he already had so many administrative, political and other problems to deal with that there were many who felt that no one man could carry out both jobs effectively.

The main points which would seem to emerge from the foregoing are broadly three in number: first, the very considerable improvement that was effected in the recent war in the machinery for inter-Allied control of operations, which included the conception of an integrated Allied Staff as opposed to the old idea of separate national staffs with liaison officers attached from the other allies: second, the close interrelationship between the three Services and the consequent importance of their being all three subordinated to a single head; third, the infinite complexity and many-sidedness of the role of a supreme commander in 1945 as compared with his counterpart in 1918.

It is, perhaps, dangerous to draw too many conclusions from these comparisons, but there would seem at least to be one lesson which we can learn. In the years between the two wars the idea of an international force under the League of Nations was suggested many times, but was turned down mainly because it was considered that, though admirable in theory, it would not work in practice. If Eisenhower's success as Supreme Allied Commander proves nothing else, it must surely serve as practical evidence that it is possible not only to subordinate national feelings and prejudices to a common cause, but also to devise a military machine, based on

the principle of an integrated international command, that will work effectively even under conditions which impose the very greatest strain on it. An international force *is*, therefore, a practical proposition; and the machine which Eisenhower forged for winning the war can well serve as a pattern for the formation of a new international force, which, acting as the agent of the Security Council, would be responsible for safeguarding the peace of the world.

French National Defense

Translated and digested by the MILITARY REVIEW from an article by Major Ph. Gouraud in "Revue de Defense Nationale" (France) June 1947.

A group of laws is being drafted in France relative to the organization of the nation in case of war. An attempt has been made to correct the lack of harmony existing between the various acts which are to be replaced.

In the law of 11 July 1938, for example, there is considerable confusion. Alongside basic principles of very general application is found detailed material dealing, among other things, with the requisition of resources or persons, and with measures of passive defense.

Among the bills that are being prepared, is one general law enunciating the basic principles underlying the organization of our national defense. Around this law, "satelite" laws will deal with the various objects this general law will define. These laws, in turn, may refer to other texts on questions of a particular nature. It is in this ensemble of laws that the law relative to the organization of our army and the laws relative to its strength, in whose discussion Parliament is engaged, will be included.

Every law relative to organization should begin with a clear definition of the notion of national defense. This question embraces several very distinct aspects. Alongside that of the armed forces, with which national defense is often confused, are found national protection, psychological defense, economic warfare and scientific research. At the present time, the above classification appears to agree with current ideas, as it emphasizes the considerable extension of the idea of defense and the close ties which join it with many activities heretofore considered to be of a strictly civil nature.

Our armed forces comprise all the military means for guaranteeing the integrity of the French Union or of participating in missions of international security. Their action is supported or complemented by auxiliary forces of a local or temporary character comprising, particularly, the formations which are organized for guerrilla operations. The constitution of these auxiliary forces and of the "formations which are organized for the purpose of guerrilla operations" will present problems which are both delicate and new to France. It seems, especially, that it will be difficult to reconcile the secrecy of guerrilla formations, which is one of the principal reasons for their effectiveness and the publicity which must necessarily be accorded legislative acts. We should truly be guilty if we failed to take into account the lessons learned from the clandestine operations of the interior forces, or neglected the aid that can be given to armed forces by elements operating in regions of our national territory that the enemy might temporarily have occupied. But it must

not be forgotten that the existence of these formations jeopardizes the security of the populations which shelter them.

National protection is born of an extension of passive defense. Its object is to diminish the vulnerability of organizations and to protect persons. In addition to purely passive measures, it puts into operation active measures which are intended to ward off enemy action.

The importance of moral factors in war has always been known. Up to the present time, however, they have often been placed in operation piecemeal. In order to show the close interdependence that exists between these factors and the ties which bind them to the system of national defense, three of them, the teaching of moral forces, protection against enemy influence, and measures aimed at the morale of the enemy, may be grouped together under the name of "psychological defense." It is possible that this will also, in the future, include other spheres of activity of consequence to national defense and relative to moral forces.

Economic warfare comprises all the measures of an economic nature whose purpose is to insure, when the need arises, a total war effort. Its purpose is, first of all, to satisfy the needs of the armed forces and to organize the economic life of the French Union in time of war. These measures include matters relative to equipment, production, assemblage of resources and their assignment and distribution, and finance.

Scientific research in national defense comprises all measures proper for the encouragement, orientation, and coordination of research on behalf of defense.

These constitute the five domains of national defense. Each one must be the object of a particular law.

It is likewise important to designate the governmental agencies which will handle matters of national defense to define the principles that must govern their relations, and to handle the territorial organization and the personal obligations of the territorial citizenry.

Article 47 of the Constitution fixes the responsibility of the president of the Council in national defense. Although it may be logical that the latter should delegate part of his authority, it seems proper that he should retain his control over the coordination of national defense as a whole. The role to be played by the Superior Council and the Committee of National Defense, which the Constitution merely mentions, as well as the roles of the permanent committees or secretaryships whose mission it is to insure coordination, should likewise be clearly defined.

There are, indeed, still many other matters that could be mentioned. The maintenance of ground forces involves a delegation of authority affecting two ministers. Thus, for example, the Ministry of War is practically the only one able to maintain the expeditionary force of Indo-China, while administration and care is the concern of the Colonial Ministry. As to employment of the armed forces, the different territories of the Union come under the president of the Council through three different ministers, interior, foreign affairs, and colonies; and under certain conditions, the minister of war. This state of affairs can create difficulties in the efforts of the high command.

One may, therefore, legitimately argue the necessity for establishing a single command for the three arms. We likewise find the possibility for double commands. Indeed, the operations of tomorrow will not all be combined. We shall find air-naval operations, air-ground operations, and operations involving the elements of but a single arm. If single command facilitates the coordination of the three arms in the case of amphibious operations, high authorities of any one of the three arms should be able to plan

and conduct operations of considerable extent with nothing but the forces of their respective arms.

At the present time, the duties of the citizen in national defense are defined by a series of military obligations, the heaviest of which is active service. The obligations of which heretofore have marked military service, would be extended under the projected bill to the national service which all citizens of either sex would be obliged to perform. This principle, which fits perfectly with the present situation of a nation in time of war, will raise some very complex problems in its application. The present form of our military service is deeply anchored in our traditions. It will require a long time to accustom Frenchmen to unequal military obligations in a system based on equal national obligations for all.

Night Combat

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IN case of war, enemy air action would be such that it would considerably restrict the possibility of deployment during daylight. Thus we would be forced to deploy during the hours of darkness. On the other hand, it is obvious that we lack sufficient armored elements to hold the initiative in daytime operations in open terrain. Here, also, the technical superiority of the enemy would limit our movements.

The only unquestioned advantage we have is a thorough knowledge of our own terrain. But if the enemy is better armed and more experienced in war, such knowledge would not give us true superiority except at night. During the hours of darkness, neither the best plans, nor the most precise and exact information, nor the best improved armament, can replace detailed knowledge of the terrain.

Thorough knowledge of night combat practice is therefore indispensable. It will give us the possibility of deploying with minimum losses; permit us to obstruct the enemy's supply; interrupt his communications; recover the defensive elements which the enemy might have captured, and annihilate the enemy armor which may have managed to penetrate our defensive boundaries during the day. It will allow us to influence enemy morale, even though its results might not be immediate. Nothing is more demoralizing to troops exhausted by combat action than to find themselves constantly molested at night.

Characteristics

Night action has many advantages and disadvantages, both for the attacker and the defender.

Darkness makes important offensive action very difficult and costly, especially when the attacker does not know the terrain and the defender has had time to organize.

Darkness deprives the attacker of two of his most valuable resources. It makes employment of his armored cars almost impossible, and it complicates the intervention of attack aviation and dive bombing. Artillery can not be employed except by previous firing, since adjustment of fire at night is very hazardous due to poor visibility. Zone fire, like air bombardment, is possible because reconnaissance flares or incendiary bombs may be used to illuminate the target. However,

the help aviation may give the infantry is insignificant unless the latter is near an object which is easily visible from the air and can be used as a reference point.

As a result, infantry must attack at night without any protection other than its own weapons, which, because of their range, can only be useful at short distances. The advance is complicated because visibility is lacking. Under such conditions, granting equality in armor, the infantry attacks an opponent who has the advantage of knowing the terrain and who has been able to organize his defense. The attacker has the further disadvantage of being forced to deploy. At night, hearing replaces sight, which results in an advantage to the defender who keeps himself motionless and listens.

Let us see how things develop for the defender. Night reduces considerably the possibilities of employing his grazing trajectory weapons. The weapons most useful to the infantry are side arms, including rifles, flamethrowers, and hand grenades. The latter, with a relatively large radius, afford a means of putting the enemy out of action by hearing rather than seeing. Moreover, the grenade has the advantage over the rifle and the flamethrower of not revealing our own position. Darkness increases the possibilities of infantry advance and facilitates surprise, provided the advance is in silence, which cannot be achieved except in small units. The value of artificial obstacles is less at night inasmuch as they can be cut, disassembled, or destroyed, if they are not properly guarded from a short distance.

Darkness has an important psychological defect. Every man is on his own, isolated from his neighbors, giving him a feeling of solitude which stimulates his imagination and which becomes hard to tolerate although he may know there is a comrade less than ten yards away. Because of this, he is ill at ease, especially if he is inactive.

All of this tends to lessen the effectiveness of defensive measures. In order to stop the enemy in a specific place, more fighting strength is needed than in daytime. Rather than reconnoitering the terrain with fire, it should be protected with men and this is not always feasible if troops cannot rest. This leads to the manning of only the important points, leaving the guard of the rest of the position to patrols.

On the other hand, darkness adds to the confusion by making it difficult to distinguish the enemy from friendly troops. This gives small well-organized units the opportunity of confusing a superior force of the enemy. For example, small Finnish patrols, with advantages of movement and knowledge of the terrain, were able to harass whole Russian companies. However, if the attackers fail to stay together and hand-to-hand fighting ensues, the fighting becomes bloody for both sides.

If large scale operations are not possible because of darkness, conditions are ideal for offensive operations, with limited objectives and limited means. Night combat thus represents perhaps the only possibility of holding the initiative while facing an enemy's superior technical resources.

Generalizations

Night combat is not improvised. It should not only be learned but constantly exercised since it demands thorough training. Darkness is a double-edged weapon, and like the terrain, it favors the one who best uses it, and hinders the one who does not. All men are not equally fit for night combat, and it will be necessary to create "surprise specialists," etc. However, it is necessary that all personnel become familiar with night combat and become accustomed to it.

It is not enough to conduct a night exercise in each instruction course as a final show. There should be at least an

applicatory exercise each week in addition to the normal training exercises.

In order to be fully complete, night combat training should include two phases:

1. Preparation for night combat, or the study of night combat technique.

2. Intense study, at night, of the possibilities of the sector in which it is decided that combat will occur, from the viewpoint of both the attack and the defense.

Night Combat Technique

Preliminary exercises.—Start first with demonstration by the individual soldier.

1. Exercises designed to teach the soldier how to deploy quietly. Demonstration of noises produced by different pieces of equipment and armament during the march, and the means of preventing such noises. Demonstration as to how to march at night, selecting the terrain to avoid silhouettes along the crests of hills. In the vicinity of the enemy, learn how to deploy irregularly, with long halts to listen.

2. Exercise to teach the soldier "to see with his ears." Determine the direction of sounds. Know how to estimate the distance of sounds.

3. Exercises in special knowledge.

(a) Orienting the soldier at night; use of the compass.

(b) Study of association through sight, hearing, and special means, such as: lamps with narrow luminous surface; electric lamps with the reflector covered with cardboard perforated with a pin; blue or green lamps using phosphorous; time coordination, using a timetable.

(c) Night use of the hand grenade; quietly putting the enemy out of action; capturing prisoners; cutting barbed wire; finding a telephone wire at night.

4. Instruction on impending combat. Night combat is combat of infantry against infantry and ends with hand to hand fighting. In the impending combat, courage and vigor being the same on both sides, the troops best instructed in this type of combat will win. Thus it is essential that the troops get particularly complete instruction in this type of combat.

Applicatory Exercises

Applicatory exercises can be conducted at the same time as preliminary exercises, combining, for example, the noiseless advance with the noise identification exercises. With a little imagination it is possible to vary these exercises indefinitely. By progressively selecting more difficult terrain, they can be made more and more interesting. Here are a few examples:

(a) To clear a limited zone, right and left, guarded by one or more guards, individually and by small groups.

(b) Approach a guard and put him out of action without alerting the enemy.

(c) Knowing the enemy's location, conduct reconnaissance without alerting the enemy and report to the proper agency.

(d) Knowing only the zone in which the enemy is located, find the exact place.

(e) Surprise operations against a guard post, an enemy "hedgehog" position, an enemy defensive element, a CP in the interior of the enemy lines, and troops deployed at night on a road.

Preparing for Night Maneuvers

Troop leading at night presents numerous problems because of the need for silence, and the difficulty of keeping contact through sight. Such problems are each time more hazardous because of the psychological effect of isolation which results from darkness. This places a great responsibility on the leader.

It is necessary to instruct the cadre for such missions. The instruction will include orientation and the issuance of orders, taking into consideration the peculiar characteristics of darkness. Such instruction will be aimed at increasing the ability of the cadre to adapt itself to sudden changes and speed in reacting.

Study for Defensive Sector

It is at times difficult for the officer who has established a defensive position to free himself of the estimate of the situation on which he based his plan of fire. It is better that reconnaissance of a sector at night be assigned to other personnel. Such reconnaissance, for example, could be a double action exercise. The detachment charged with the defense would split up in a number of patrols and all the possibilities of attack rehearsed. It would be necessary to have each group go from the attack to the defense to teach them how to react both ways. To test what has been gained by these experiences, it would be instructive to attack the sector with some other unit. The objective is to give the cadre a thorough knowledge of the resources of the sector.

It is necessary to study, also, the possibilities of counterattacks aimed at freeing a point which has suffered heavy enemy pressure, or to retake a defense element captured by the enemy, an operation which would be less costly at night than in daytime if well conducted.

Outside of its tactical value, such preparation also has considerable morale value, since it increases the confidence of the troops in themselves and in the terrain.

In conclusion I wish to pay tribute to the splendid fighting spirit, heroism and endurance of the ordinary soldier. And if I were asked what is the greatest single factor which contributed to his success, I would say morale. I call morale the greatest single factor in war. A high morale is based on discipline, self-respect and confidence of the soldier in his commanders, in his weapons and in himself. Without high morale, no success can be achieved, however good may be the strategic or tactical plan, or anything else. High morale is a pearl of very great price. And the surest way to obtain it is by success in battle.

Field Marshal Viscount Bernard L. Montgomery

The New Belgian Army

Translated and digested by the MILITARY REVIEW from an article by Lieutenant Herbert Alboth in "Allgemeine Schweizerische Militarzeitung" (Switzerland) June 1947.

AFTER the eighteen-day campaign in May 1940, Belgium was completely occupied, thousands of its active and reserve officers were German captives, and its military organization was destroyed. Only in the months following defeat did the Belgians begin again, in England, to gather themselves together for battle. It is now interesting to follow the various steps which led from these small beginnings to the modern Belgian Army of today.

Exiled Belgian authorities in England first began recruiting Belgians in Allied and neutral countries. To them, also, hastened the Belgians who were able to escape and make their way from Europe to England. But the Belgian forces fighting with the Allies never totaled more than 2,000 men. These included one company each of parachute and commando forces. The Belgian Air Force in England in 1944 included 500 pilots, navigators and gunners.

The exiled Belgian government soon realized that these measures were not sufficient and that any rights that might derive from victory over the common enemy would one day be determined on the basis of its military effort. It immediately went to work on plans for creating the necessary forces when the mother country was liberated. In conjunction with the English War Office, the exiled government decided to create immediately the following units: twelve infantry and six engineer battalions, and auxiliary technical troops. In the second phase, plans called for a complete infantry division as well as a new Belgian military organization. The government took all necessary preliminary steps toward the realization of these aims. The necessary equipment depots were established which, after the liberation, could be moved to Belgium along with three organized draft and recruiting bureaus. Boxes containing necessary instructions and regulations for each newly formed unit were prepared. A law voted by the ministers council gave the defense minister authority to call all former soldiers as well as the militia of the class of 1944 to the colors, to call for volunteers, and to purge the army of collaborators, as soon as Belgium was liberated.

After the landing on the continent, the Belgian detachment assumed an honorable place in the battle of France and Belgium, after Belgian paratroops had already played an effective part in the operations. The company of Belgian commandos fought in Italy, the Channel Islands and on the Brittany coast.

A few days after the liberation of Brussels on 9 September 1944, three Belgian officers flew to the capital and began organizing the Belgian units. This well organized mission carried on an important and valuable task. No difficulties were encountered in creating the units since the youth of Belgium displayed great enthusiasm for the Army and the number of volunteers was beyond all expectations. At insistent Allied requests, these troops were first engaged in guarding the extended communication lines of the fighting armies.

When it appeared that the war would continue beyond 1944, still greater participation by Belgium was planned. For guarding the Allied communication lines, 91,000 men of the Liberated Manpower Units (LMU) and six infantry brigades with a total of 24,000 men were organized as combat troops, and between October 1944 and May 1945 took their places in the Allied Armies.

One unit already engaged in combat.

was designated the 1st Brigade. The remaining brigades were reorganized, shipped to Ireland, and after six months returned to their mother country with the most modern equipment and weapons.

Greater difficulties were encountered in organizing LMU troops, as the necessary barracks and training centers were lacking. Although their organization had not been completed on VE-day, these units made a valuable contribution to the war effort. Of all the small countries of the United Nations, Belgium was the only one which created a new military organization during the last eight months of the war, and was therefore able to render valuable military aid to the Allies. At the time of Germany's collapse, the 1st Brigade contributed largely to liquidating German occupants of Northern Holland. Belgian battalions participated in the operations in the Ardennes, in the crossing of the Rhine at Wesel, and at Remagen. On the day of final victory, Belgian units were to be found on all the highways of Germany and even in Czechoslovakia.

By the end of the war, Belgium had six complete infantry brigades and 137 units of the LMU forces. With the help of these, two pressing tasks were immediately undertaken: the occupation of an assigned sector in Germany, and the economic restoration of the nation. In addition to those employed on occupation duties, units were immediately organized for national restoration. Demining battalions rendered valuable services for many months. Forest companies helped to restore damaged and ruined forests. Technical units assisted in coal mines and in vital works and industries. Guard units took charge of war prisoner camps.

While reorganization of the whole Army was begun, steps were taken to provide for its future command. In the first restored training school, Tervueren, cadres were trained for the new units. In January 1946, the "Ecole Royale Militaire" was again opened. This had been reorganized to employ English training methods and served to train future officers. The Beverloo noncommissioned officers' school, founded in July 1945, permitted additional training for noncommissioned officers returning from German imprisonment and for volunteers who wished to remain in the Army. In October 1946, the Brigade Schools for officer candidates were founded. By summer of 1946, the officer candidate schools for the different branches of the service and the "Institut Militaire d'Education Physique" were again open.

For taking care of problems in Germany, Belgium now possesses an army corps of two infantry divisions of three brigades each, and in addition, special shock troops, railroad troops and rear services. The shock troops have one regiment each of parachute and commando troops.

In March 1946, all men who had reached twenty years of age were called to the colors. Together with the other classes that have been called, the period of active service of these recruits lasts for a period of twelve months. They are first required to attend one of the six Basic Training Centers (CIP) where for a period of six weeks they receive their first elementary training and are later assigned to the training centers of the different branches of the service. In the case of the infantry, artillery and engineer branches, this additional training lasts until the end of the fourth month, and in the case of the armored branch and signal service, until the end of the sixth month.

In spite of the adoption of English training methods, weapons and equipment, the Belgians today are making a great effort to restore a purely Belgian character to the Army. This involves reviving the traditions in the new Army. In each brigade, battalions have received the names of the regiments of 1940. If old flags still exist, these are returned. Those that

were destroyed are replaced with new ones. Armored and motorized units respect the names of old formations.

Wherever possible, the Army is adapted to the requirements of the times and the lessons taught by war. The "Service d'Education" deals with the civic education of men in service. Wherever its members are met today, the Belgian Army creates a favorable impression. When away from quarters, every officer is saluted in accordance with Belgian regulations.

In addition to printed material issued by the "Service d'Education," the propaganda service of the Defense Ministry publishes an army paper. "L'Armée de la Nation" orientates the troops by interesting articles and pictures on the life and problems of the forces in Germany, developments in the Army, international policy, and events in Belgium and the Congo in Africa where there are a few units of colonial troops.

By a decree of the Prince Regent, a mixed commission has been formed to deal with the future organization of the Belgian Army. Belgium is determined to possess a powerful and efficient army.

In January 1947, the Cadet School was again opened. In October, the first courses started in the newly founded War College. A school for paratroops and tank drivers is also planned. Problems connected with cadres and reserve units are again receiving attention. It is planned to train one regiment each of parachute and commando troops each year. After two years, the paratroop age-classes will go into the reserve of airborne forces so the Belgian Army of the future will always have three regiments of young and well-trained paratroops.

Military events and developments in other countries are also closely followed in Belgium in order that the Army will profit by developments and remain abreast of the times.

Canadian Infantry in the Liri Valley

Digested by the MILITARY REVIEW from an article by Major General Christopher Vokes in "Canadian Army Journal" July 1947.

THE Italian winter commencing in December 1943 had imposed conditions of ground and weather which made large-scale offensive operations extremely difficult and costly. Hence the Germans and the Allied Armies continued to face each other on a line running roughly from Ortona on the Adriatic to Minturno on the Mediterranean. The seaborne landing, carried out at Anzio in February 1944, in an attempt to relieve this stalemate and effect the capture of Rome, had failed in its object and left the Allies the alternative of maintaining a costly beachhead or withdrawing from it. The latter course would have been a severe blow to Allied prestige.

In the meantime, great events were shaping elsewhere. The "Second Front" was to be opened by the Western Allies in 1944 by the invasion of German-occupied France. This all-out effort and a large-scale offensive by the Soviets were to be the mighty blows which would beat the German Armies to their knees. Under such circumstances, the Allied effort in Italy was bound to assume the guise of a strategic detachment in order to economize in military resources needed prior to and subsequent to the invasion.

The purpose of a detachment is to cause a military threat which will contain forces of the enemy (superior forces, if possible) and thereby weaken him where

the main blows are to be struck. In Italy it could prevent enemy withdrawal of battle-experienced divisions to northwest Europe or to the Russian front. To achieve this purpose, the Allied forces would require a vigorous defensive throughout the winter months, and to mount large-scale offensive operations as soon as the ground and weather became fit. This could not be done before May. At the same time it was essential that Rome be captured as soon as possible, because of its world-wide value in politics and propaganda.

German Viewpoint

There is no doubt that the Germans realized that there were big events afoot for the summer of 1944, and were well aware that the main Allied blows would come elsewhere than in Italy. At the same time they probably reasoned that any disaster to their forces in that theater would open the way to the Balkans and Austria. Complete withdrawal was impossible. In spite of the long line of communications involved, defensive operations could be more economically conducted by holding in the mountainous parts of Italy than by withdrawing to the Po River and the plains of Lombardy. Any withdrawal would be a fighting withdrawal during those months when offensive operations were possible in Italy, until winter could again step in on the German side.

The Germans took steps, therefore, throughout the winter of 1944, to strengthen their defenses by the construction of elaborately-fortified layback positions in places where the terrain between the mountain ranges was suitable for all-out offensive operations. By this means they hoped to reduce to a minimum the force required to hold Italy. In the meantime, if defensive operations during the winter became slack and the prospect of an Allied offensive were diminished by heavy withdrawals for other fronts, the Germans could take advantage of this situation and spare some of their forces from the Italian front for use elsewhere. That they were unable to withdraw any appreciable force without replacement is an indication that the Allied Armies in Italy fulfilled their task admirably.

The Offensive Plan

The Allied plans for the offensive in May was to stage an all-out attack by the Eighth British and Fifth American Armies between Cassino and the Mediterranean Sea, with the object of destroying the German Armies in Italy and, incidental to this, capturing Rome. The offensive was to commence on the night of 11-12 May, and when this had drawn off the German reserves, the Allied force maintained in the Anzio beachhead was to break out and drive for Rome with all speed. The timing of this breakout required a very close prediction by the Commander in Chief, as the force concerned required a period of notice to move.

The success of the offensive is now history. Within five months the Allied Armies had advanced nearly 300 miles to debouch on the Northern Plains, where, unfortunately, the weather again intervened in favor of the enemy. This advance was only accomplished after much hard fighting in difficult country which taxed to the utmost the ingenuity and resources of the troops. It was a first-class feat by American and Empire forces which has tended to become obscured by the magnitude of the military successes which occurred in northwest Europe during the same period.

With these remarks, we may now return to the beginning of the offensive in May, and describe the part played by the 1st Canadian division during the break-out phase in the Liri Valley.

Eighth Army Situation

By April 1944, the Eighth Army faced the Germans on a line from Ortona on the Adriatic, over the mountains to Cassino and thence along the Gari River to its

confluence with the River Liri. The valley of the Liri offered ample scope for deployment and offensive maneuver, once the Gari had been forced by assault. The whole of the area was, however, dominated by the Cassino Monastery and Monte Cairo on the northern side, and on the other side by the high mountain slopes close to and south of the Liri River. A first-class highway, No. 6—a direct route from Naples to Rome—ran close to the base of Monte Cairo. No other good roads existed, although there were several indifferent dirt roads and tracks lying south of the main road.

Enemy Situation

To back his forward defenses running along the Gari, and to add depth to the position, the enemy had constructed a heavily-fortified layback position known as the Adolf Hitler Line. Hinged on the Monastery, it was refused back along the base of Monte Cairo to Piedimonte, thence to Aquino, to Pontecorvo and from there across the Liri River into the nearby mountains. This gave a depth of between eight and nine miles to the enemy defenses. So long as the enemy held Monte Cairo and the Monastery, the artillery observation thus afforded turned the area between the forward defenses and the layback position into a huge killing ground. The capture of Monte Cairo, therefore, was necessarily an important feature of the Eighth Army plan.

Eighth Army Plan

The Army plan for the opening phases was as follows:

1. Polish Corps was to assault and capture the Monastery and Monte Cairo.

2. XIII Corps commanding the 4th British and 8th Indian Divisions was simultaneously to assault across the Gari with these divisions and form bridgeheads.

3. Having achieved these bridgeheads:

(a) XIII Corps was to exploit with 78th Division which was to swing right and cut Highway No. 6 between Aquino and Piedimonte. 6th Armored Division was also available to this Corps for further exploitation and pursuit.

(b) The 1st Canadian Corps was to cross the Gari and operate between XIII Corps and the Liri River. In this operation, the 1st Canadian Division would pass through the 8th Indian Division and exploit forward to make contact with, and eventually breach, the layback position between Aquino and Pontecorvo. The 5th Canadian Armored Division was to be held available to exploit this breach and conduct pursuit.

(c) The French Expeditionary Corps under Fifth American Army was to assault on the left of Eighth Army, with its right resting on the Liri River.

(d) "H" Hour was fixed for 2300 hours on the night of 11-12 May 1944.

Eighth Army Attack

The assault across the Gari commenced at 2300 hours, 11-12 May, under artillery support provided by the massed guns of the Eighth Army—nearly one thousand guns of all calibers. The fighting was severe, but by 16 May, bridgeheads had been secured by the 4th British and 8th Indian Divisions. The Polish Corps were well ahead with their difficult task. On the night of 16-17 May, the 78th British and 1st Canadian Divisions commenced their moves across the Gari River, and on 17 May, the leading brigades advanced out of the bridgeheads.

Contact with Hitler Line

Late on 19 May, after steady progress in the face of heavy shelling and isolated pockets of resistance, the 1st and 3d Canadian Infantry Brigades made contact with the Adolf Hitler Line between Aquino and Pontecorvo. On 20 May it was proved by ground reconnaissance to be as strong as previous intelligence reports had indicated. This reconnaissance was intensified during the days following, and all along the front probing attacks at the

enemy defenses were continued by day and night.

In the meantime, the 78th Division had progressed well, and their task of cutting Highway No. 6 was in process of fulfilment. This formation was also making contact with the Hitler Line on the right flank of the 1st Canadian Division. The Poles were engaged in the capture of Monte Cairo.

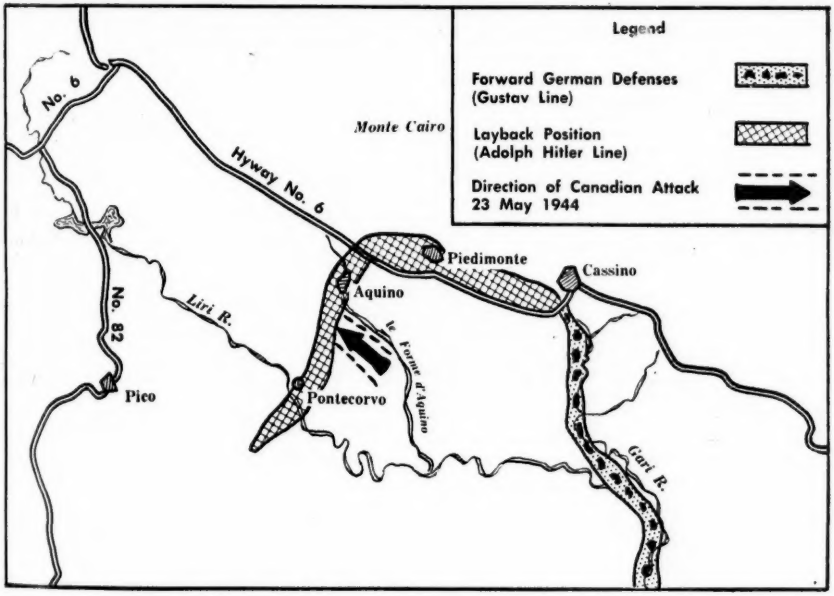
1st Canadian Division Plan

The governing factor in the selection of the point for the attack by the 1st Canadian Division was ground suitable for armored support by 25th (British) Army Tank Brigade under divisional command. The ground in the vicinity of Pontecorvo was unsuitable, because the approach was very exposed and a very deep gully behind the defenses and in front of Pontecorvo would limit tank movement. The most favorable lane of attack, about 3,000 yards in width, ran parallel to and with le Forme d'Aquino as its right boundary. This had a serious disadvantage in that it was enfiladed from Aquino, a strong bastion in the German defenses. No other alternative offered.

The assault was designed to penetrate the enemy defenses in two phases: Phase I, to breach the field defenses and obtain a firm lodgment; and Phase II, to deepen and enlarge the breach to permit the passage of the 5th Canadian Armored Division to exploit.

The divisional commander did not deem it desirable to involve the 1st Infantry Brigade and the Reconnaissance Regiment in the attack. These troops were engaging the defenses in the vicinity of Pontecorvo by infiltrating attacks and were enjoying fair success, besides which their efforts would serve as a diversion during the main attack. The main assault would, therefore, fall on the 2d and 3d Brigades, supported by the bulk of the armor of 25th Army Tank Brigade.

The divisional commander decided to at-



tack simultaneously with three battalions and to detail the Royal 22d Regiment together with the Three Rivers Regiment as divisional reserve. The 2d Brigade and 3d Brigade were to be positioned right and left, respectively; Princess Patricia's Canadian Light Infantry and the Seaforth Highlanders were to lead the 2d Brigade, and the Carleton and York Regiment was to lead the 3d Brigade. Reserve battalions were the Loyal Edmonton Regiment and the West Nova Scotia Regiment. These units were to be employed in Phase II.

The artillery plan involved the employment of approximately 800 guns of all types. Each phase of the assault was to be conducted under a barrage and arrangements were made for simultaneous intensive counterbattery and countermortar fire. All moves and preparations were to be completed by midnight, 22-23 May. "H" Hour was 0600, 23 May, and the operation was to be known by the code name "Chesterfield."

The Attack

The morning of 23 May was bright and clear, and the attack commenced on schedule.

In the early stages, the expected fog of war persisted for a long time, and, as reports began to trickle in of fierce enemy resistance, Phase II was postponed indefinitely. It was 1200 hours before the situation was clarified to the extent that the Division Commander could formulate his plans for further action. By this time the situation was:

1. 2d Infantry Brigade:

(a) Tanks unable to get through undisclosed minefields sited behind thick and continuous belts of wire. Many tanks reported knocked out by antitank fire from enemy guns in Aquino.

(b) It was believed that Princess Patricia's Canadian Light Infantry and Seaforth Highlanders each had two companies on the objective, but these companies were without armor or antitank weapons. The reserve companies were pinned and could make no progress.

(c) The Loyal Edmonton Regiment had been launched prematurely and was also pinned by enemy defensive fire.

(d) Communications within the battalions were practically non-existent except for runners, who could not get near the forward elements.

(e) Casualties were heavy.

2. 3d Infantry Brigade:

(a) Carleton and York Regiment was on the first objective with tanks and antitank guns.

(b) West Nova Scotio Regiment had been moved forward and was also on the first objective ready for the second phase.

(c) Both battalions were exposed to heavy and continuous shelling and mortar fire and had dug in.

3. General:

(a) The enemy was reacting strongly. One counterattack developing from Aquino was beaten off by artillery fire and by the fire of a squadron of the 12th Canadian Tank Regiment, which had been disposed to watch the right flank.

(b) A large number of prisoners, all very badly shaken, had been taken by the 3d Infantry Brigade.

(c) All tanks of 25th Army Tank Brigade still in action were running short of fuel and required re-arming.

The divisional commander delayed the issue of orders for amended Phase II objectives until 1245 hours in the hope that some of the obscurity on the 2d Brigade front would dissolve. But it was evident that if any advantage were to result from the limited success already gained by the 3d Brigade, further delay was unwarranted.

By 1300 hours, the commander of the 3d Brigade had been briefed, and amended objectives had been marked on his map. The Royal 22d Regiment reverted to brigade control and the 12th Canadian Tank Regi-

ment (less one squadron) was placed in support of the brigade. As the Artillery Plan for Phase II was suitable, no alteration was made.

Since it was anticipated that considerable time would be required to issue and disseminate the new orders necessitated by the changes in the objectives, the fixing of "H" Hour was held in abeyance on the understanding that the divisional commander must have thirty minutes' notice in order to warn the guns.

At 1610 hours the brigade notified the divisional commander that the 3d Brigade would be ready in thirty minutes, and "H" Hour for the second phase was then fixed at 1650 hours.

When the attack began, an enemy counterattack on a large scale was beginning against the 3d Brigade sector. At last luck was on our side. The enemy was caught in the open by the barrage and, by 1800 hours, the units of the 3d Brigade had reached all their objectives and were mopping up and taking prisoners in large numbers.

Results of the Battle

The breach was now secured. A marked lessening of enemy resistance became slowly apparent across the entire divisional front. During the night of 23-24 May, 5th Canadian Armored Division commenced its passage through the breach; after a few nocturnal skirmishes, this formation was well on its way by daybreak, 24 May.

During the night of 23-24 May, the units of the 1st Brigade lodged themselves in the enemy defenses on their front and then began mopping up, establishing contact with the 3d Brigade on their right at first light.

Thus ended the battle which breached the Hitler Line. It was a hard-fought battle, with a slim margin between success and failure. The cost in casualties, especially in the 2d Brigade, was high, but, measured in terms of the magnitude of the success, the cost was not in vain. As a result of the battle, the Germans were in full retreat—a retreat which ended only when they reached the Arno River at Florence.

Lessons of the Battle

Although the battle ended in a resounding success from the command point of view, the great lesson learned was the need for greater flexibility, first, in the estimate of timing for the progress of the battle, and, secondly, in the artillery plan.

An estimate of timing in the progress of the battle is an essential feature of any military plan, since this plan must coordinate all the resources available to the commanders. On the other hand, enemy reaction often upsets the rate of progress, and it is quite impossible to stick to a rigid time-table.

In this particular battle, the estimated timing for gaining the objectives of the first phase was seventy-five minutes. This estimate was based on a rate of advance of one hundred yards in five minutes for an average distance of 1,500 yards. After the first phase, there was to be a pause of sixty minutes to consolidate and prepare units hitherto in reserve to follow through during the second phase. During the planning it was foreseen that the second phase might not start on time, and warnings were issued to all concerned. During the second phase, the estimated timing required to carry the objectives was fifty minutes. This involved an advance of 1,600 yards at a rate of 100 yards in three minutes.

The battle opened at 0600. The first phase should have been completed at 0715, and the second phase should have commenced at 0815 and completed by 0905, if it had been possible to stick to the original time-table. As it turned out, it was 1200 before it was possible to say that there had been partial success on the left flank of the attack and that the follow-through

battalion of the 3d Infantry Brigade was in a position to commence the second phase. On the right the situation was still very obscure, as there were reports that elements of the leading infantry battalions were on the first objective, but it was not until about 1245 that it became quite clear that the attack of the 2d Infantry Brigade was hopelessly bogged down.

A divisional success depended, therefore, on exploitation of the success gained by committing the divisional reserve—one infantry battalion and an armored regiment (Royal 22d Regiment and 12th Canadian Tank Regiment). Consequently, the objectives of the 3d Infantry Brigade had to be enlarged and new orders issued to the units involved. It will be remembered that one of these, the West Nova Scotia Regiment, was then dug in on the first phase objective, under heavy fire. Under these circumstances, the briefing of this battalion took considerable time and a modified second phase for the infantry attack commenced, not at 0815, but at 1650—eight hours and thirty-five minutes after the original estimate.

The 3d Infantry Brigade was ready and proceeded with the altered second phase attack three hours and fifty minutes after the Divisional Commander had completed briefing the brigade commander at 1300. If the plan had required alteration of the original artillery plan, a much longer time would have been required because of the mass of artillery involved. Under these circumstances, therefore, no time was lost by the brigade in the transmission of orders and battle deployment.

The original timing predicted for the second phase was not far out, as this phase was completed prior to 1800—less than seventy minutes after commencement —with the amended objectives firmly held by our troops. It will be remembered that the estimated time to reach the objectives was fifty minutes.

The Artillery Plan

The original timing may be criticized because it lacked flexibility. This lack of flexibility was due in great measure to the fact that the advance, in each phase, was to take place under a barrage. This form of support requires a set rate of advance in order to work out the gun programs and the attacking infantry must follow closely (i.e., lean into it) if the neutralizing effect of the fire is to be of use. Otherwise, determined defenders who "pop up" after the fire has lifted can cause serious delay to the attacking infantry. The result is that the barrage gets away, is most difficult to stop, and almost impossible to bring back—especially when a mass of artillery is engaged. It is the most inflexible form of artillery support in the gunner's lexicon. Regardless of any success it may have achieved elsewhere, this form of support never suited the mentality of the Canadian soldier in Italy.

The infantryman requires a form of artillery support which he can stop, recall, and start at will during the course of battle. In the very fluid battle, concentrations on call serve admirably; but against well-organized and stubborn resistence, there must be form of support which had the good points of the barrage and the flexibility of the concentration.

During the period between the Liri Valley battle and the battles fought by the 1st Canadian Division later in the year, a different method of artillery support was devised which incorporated these requirements.

This method consisted of a series of block concentrations, overlapping in depth and fired in lanes across the frontage of attack. Each block was given a number, letter or code name.

In addition to other considerations, the fire plan involved the following points:

1. Number of lanes required, frontage and depth of attack and number of units involved.

2. Overall estimated rate of advance—on which depended the period of fire of each concentration.

3. The artillery resources (guns, ammunition, Forward Observation Officers) available—on which depended the density and rate of fire for each block, and also whether conditions under (1) above could be met.

This type of fire worked well in practice, as it had the following advantages:

1. Block concentrations could be fired independently of others. They could, therefore, be recalled and repeated "on call" as desired by the forward infantry. Consequently, unlike the ordinary barrage, the fire support could be controlled, if necessary, by the man on the spot.

2. It was economical of ammunition, since the fire support never "ran away" from the forward infantry, as happened on innumerable occasions with the ordinary barrage.

3. It was better adapted to the ebb and flow of the advance, since it permitted portions of the attack delayed by enemy action to progress independently, without alterations in the fire plan.

4. It had all the flexibility and control of concentrations "on call" as opposed to the inflexibility of the ordinary barrage.

5. It required less time to work out a fire plan built on less lines than was required in the case of the ordinary barrage.

6. The commander could, at all times, get a clear picture of the situation through artillery channels.

The only disadvantage was the difficulty of control by the forward infantry at night; for night attacks the ordinary barrage was better so long as the objectives were not deep and the rate of advance more or less closely estimated.

Conclusion

Notwithstanding this critical analysis, the plan for this battle, with the necessary alterations imposed by the circumstances, worked well. Because the object of the attack never varied, and because it was forced home with determination, the enemy was compelled to conform to the plan and was beaten. Any simple plan of battle is a good plan and has a chance of success, and this plan was simple in the extreme. In theory, battles move much more quickly than they do in practice. This is one of the most difficult lessons for the student who has had no battle experience.

This battle exemplifies very clearly the three phases of battle against organized resistance, i.e., the "Break-In," the "Dog-Fight" and the "Break-Out."

The "Break-In," to obtain lodgment in the enemy defenses, was partially successful during Phase I. The "Dog-Fight," i.e., the period of strong enemy reaction and the widening and deepening of the breach by exploiting partial success, followed during the long pause and Phase II. The "Break-Out" role was assumed by the 5th Canadian Armored Division, and it will be noted, here, that the forward elements of this formation were involved in some hot skirmish work on the outer edges of the breach before they were free to surge forward.

Tank Attacks in Winter

Translated and digested by the MILITARY REVIEW from an article by Colonel V. Saushkin in "Krasnaia Zvezda" (USSR) 25 January 1947.

SNOW affects the action and movement of tanks and motorized units. Tank action becomes especially difficult in terrain broken by numerous ravines, draws and bushes. Snow stays in such places longer and its depth may make such areas impassable.

The contention that winter prevents tanks from maneuvering is not generally correct. At the beginning of the winter, when the soil freezes and becomes hard and thus passable for all caterpillar and wheeled vehicles, tank maneuvers are not impeded, but on the contrary are made easier. It should be remembered that at the beginning of the winter all swamps, lakes and rivers are covered by ice. If the ice is sufficiently strong, the tanks are not tied to roads and can move through any terrain without losing their main qualities—high mobility and maneuverability.

Later when the temperature drops and the amount of precipitation increases, a difficult period begins. The most important phenomena affecting the action of tanks and motorized units are snowfalls and blizzards especially when the existing snow cover is already deep. In addition to the difficulties experienced in connection with deep snow cover, orientation becomes extremely complicated. Advancing units may easily lose the direction of attack and get into various traps set by the enemy, which are unnoticeable because of the deep snow, and what is most dangerous, the tanks may suddenly find themselves under fire of antitank guns of the enemy. During a snowfall the outside surfaces of the instrument glasses become filled up with snow which may blind most of the tanks.

However, snow-fall and blizzards have their advantages. They conceal the tanks and allow the commander to carry out surprise maneuvers.

At the end of winter, when the thaw begins, maneuvering of tanks becomes extremely difficult and sometimes absolutely impossible if the action takes place off the roads.

Generally speaking, it can be stated that in the winter the tanks can move off the roads, and this advantage over the other types of troops remains assentially the same.

World War II abounds in numerous examples of successful action of tanks in winter. Our motorized units, acting independently or together with the infantry moving on skis, successfully advanced over terrain covered by forests and swamps.

One of our units, for example, was to attack a large village which was situated between two deep ravines. Snow in the ravines was three or more feet deep. Having fortified these ravines by mine fields, the Germans were sure that their flanks were well protected. The front of the German position faced a plain. Therefore, they concentrated here the greatest part of their fire power. To the right of the village, within about four kilometers, was a swamp which did not freeze even in winter. Consequently, any encirclement or maneuver from the right was difficult and would have taken considerable time.

The village had to be taken since it was necessary to capture the road intersection which was located three or four kilometers beyond the village.

The plan of the attack was as follows. The front of the position was to be attacked by infantry only. The tanks were to be used on the right flank and were to advance through the ravines, because the enemy would not expect this move,

thinking that the snow-covered ravines would stop any tank. Furthermore, at least one tank platoon was to advance through the swamp. This platoon and a group of skiers could reach the road intersection, thus cutting the only route of retreat for the garrison of the village.

It should also be pointed out that to the right of the village was a swampy grove, the soil of which was frozen. This grove played an important part in the selection of the direction for the main attack. It enabled the tanks to assemble in concealment. That is why it was decided to attack from the right, although the ravine here was deeper and had steeper slopes than on the left flank.

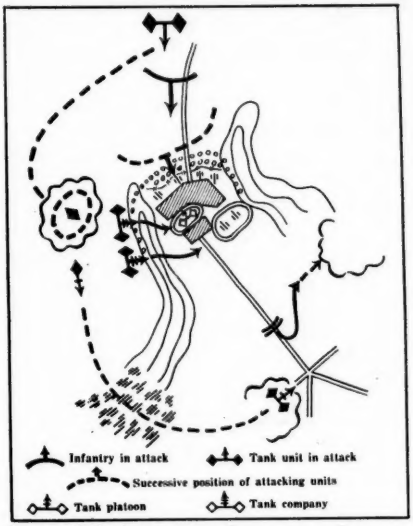
The scouts measured carefully the depth of the snow cover, especially in the right ravine. At night the scouts and sappers went into the ravine, and marked the battle course for the tanks. They prepared six routes, all of which were extremely winding, inasmuch as the snow did not cover the ravine evenly. The sappers removed two layers of mines from the forward slope of the ravine and the mines which the enemy had installed at the bottom of the ravine.

On the same night, the tanks and the infantry attached to them assembled in the grove. This could be done before darkness, for the falling snow concealed their movements.

The following morning after an artillery preparation, the German position was attacked simultaneously from the front and the right flank. The attack on the right flank developed as follows. The forward slope of the ravine was very steep. There was a lot of snow here. The opposite slope was gentle and had very little snow.

At first the ravine was entered by the skiers who moved about 150 meters ahead of the tanks. Then went the tanks. Inasmuch as there were six routes for the movement of the tanks and as long as only one tank could move over a route at any one time, it was necessary to commit the tanks not simultaneously, but in three waves. The first tanks met with the greatest difficulties, for they had to break the way through the snow for the remaining tanks. They moved very slowly.

Every tank moved as fast as it could when approaching the ravine. Then by its weight it broke the snow on the forward slope and finally reached the opposite end of the ravine. The Germans, occupied primarily in repelling the attack from the



front, failed to open fire even when our first tanks were going through the ravine. Only when the second wave was approaching the ravine did they open fire and send out five of their tanks. A fire fight quickly developed. Part of our tanks fired at the German tanks, thus enabling the other tanks to cross the ravine.

Soon after this, the attackers broke into the village from the front and from the flank. The Germans withdrew along the road, but they were fired at by the tank platoon which had managed to cross the swamp and occupy the intersection.

The Germans, having encountered the ambush at the intersection of the road, abandoned their matériel on the road and turned to the left toward the grove. After crossing the ravine, our soldiers had attacked the village without skis, and had advanced through the village for a considerable distance. Nobody thought of packing up the skis and bringing them up to the advancing unit. As a result, the Germans could not be pursued.

This shows that attacks in the winter have their characteristic peculiarities which can be skillfully utilized. One should know how to utilize these conditions in one's own interest. In the above example, these peculiarities determined the direction of the main attack, for it is doubtful that the tanks would have gone through the deep ravine and assembled in the grove had it not been for the particular conditions prevailing at the time.

But winter conditions affect other things besides the direction of main attack. First of all, they affect the length of time required for preparation of the troops. They call for more careful reconnaissance. They also call for accurate marking of routes of advance. Winter operations are also affected by short daylight hours. However, winter nights are generally a little lighter than in the summer time, which greatly facilitates night operations.

In winter, the movement of tanks and infantry over deep snow is naturally slowed down. The infantry is often compelled to attack ahead of the tanks, and this calls for a special organization of fires for the protection of attacking infantry. Fire fights become more frequent, and the tempo of advance is more dependent on fire support, especially artillery support and the fire delivered by tanks.

Winter also changes the character of cooperation among tanks, infantry and artillery. The part played by the infantry in supporting the action of the tanks is increased. Not only must it follow the tanks during all the stages of the engagement, but it must help the tanks to overcome snow drifts. The importance of artillery support is increased to a still greater degree.

As is seen in this example, winter conditions compel the tanks to attack on a narrower front than in the summer time, and this affects the battle formation of attacking tank units. Battalion line formation cannot always be used. Tanks must often be deeply echeloned either to the right or to the left. Such formations enable the unit, without reforming, to deliver effective fires toward the flanks. Generally speaking, it is advisable to avoid unnecessary changes in the formation since snow cover makes such maneuvers difficult.

Experience shows that action of troops in the winter does not differ greatly from that in the summer. In spite of the difficulties involved in the movement of tanks over snow, units resorting to bold maneuvers achieve a greater measure of success.

A soldier needs as much confidence in his ability as the instructor who teaches him.

Revista del Ejército, Marina y Aeronáutica (Venezuela)

New Missiles

Digested by the MILITARY REVIEW from an official British source in "Journal Royal United Service Institution" (Great Britain) May 1947.

THAT the imagination of the general public was caught by the determined use by the Germans of the flying bomb and the rocket cannot be denied. Nebulous ideas, centering round the V-2 especially, grew rapidly as the European war closed. It is as well to remember, however, that the A-4 (or V-2) represents but one type in seven classes of rocket weapons and only one of the approximately 110 different missiles which the Germans were developing when the war ended. The A-4 has become, rather unfortunately, the yard-stick by which all rocket theories are measured and established, thus intelligent discussion in the broad field of new missiles is more often than not precluded. Again, the narrow specialization which followed in the wake of new and unorthodox armament during the war, due to the exigencies of the moment, may, if undue importance is attached to it, distort our vision. Furthermore, unless we are very careful, our perspective may be upset by wars of nerves; "Rockets over Sweden," "Trails seen over Greece," "unusual fragments under examination by experts."

In order not to allow our perspective to become distorted, it is well to remember that new and secret weapons of the past had a like reaction on the minds of nations other than those in possession of the weapon. Submarines, military aircraft, tanks, chemical warfare and other weapons each in turn have played a part of lesser or greater importance in previous wars of nerves, but each in its turn retreated into the pages of historical data or training pamphlets as its power became neutralized by improved defensive weapons.

In this article, it is intended to introduce a short series of accounts of the guided missiles which were developed by the Germans. It will cover types of missiles used under three main headings; ground to air; air to ground; and air to air. The missiles described should not be measured by too close a study of the A-4. This may be a common failing on the part of the reader as the capabilities of the A-4 are well known, and some of its major features have been incorporated in a similar German anti-aircraft weapon known as the *Wasserfall.* The *Wasserfall,* however, is a heavy artillery piece, and, therefore, is unlikely to be used in its present form by an air force.

Regarding the future development of guided missiles, it is heartening to bear in mind that all nations are starting from scratch, at the point where Germany left off. Without doubt, the Germans were eight to ten years ahead of any other nation in the development of this form of warfare. Their technicians had developed rockets to a degree of thoroughness and efficiency considered impossible at the beginning of the war.

Despite tremendous strides made by Germany, there is still much room for improvement in the pay load and range of the missile. Also the methods of guiding and homing leave much to be desired, as these developments are as yet in the infancy stage. Before perfection to any great extent can be attained in the production of guided missiles, a vast amount of integration must be carried out in the sciences of aerodynamics, fuels, supersonics, explosives, compressibility and ballistics. The Germans had made great advances in this direction, but it is obvious that they were only in the initial phase.

One fact which emerges from the known data is that in the exploitation of guided

missiles, air superiority is essential especially in the field of airborne missiles. Had the German Air Force been stronger during the latter stages of the war, this latter type of missile would have become more prominent, and perhaps more would have become known of it. Nevertheless the Germans did gain successes with this weapon in the Mediterranean, notably in the sinking of the Italian battleship, the "Roma," wherein the *Fritz X* radio-controlled bomb was used. These successes have proved that there is an important future in the airborne missile, but equally, it has been proved that air superiority is an absolute necessity for the successful use of all types of guided missiles.

Fundamental Principles

Let us consider the fundamental principles together with the essentials of each main type of rocket propulsion which future air armament is likely to embrace. In this the characteristics of AA weapons must not be excluded, since we may become equally concerned with missiles aimed at, as well as from, aircraft, not to mention the possibility of these weapons being adapted for airborne purposes.

The types of propulsion so far experienced fall into four main classes:

(1) Solid fuel motors.

(2) Liquid bi-fuel motors.

(3) The Intermittent jet or Argus Reed motor.

(4) The athodyd, Ram Jet or Lorin Tube.

In passing, the turbo-jet should also be mentioned, but at present this lies outside the scope of the expendable projects under consideration owing to its costly manufacture.

The Rocket Motor

It must be emphasized that, whatever type of propulsion unit is employed in guided missiles, the unit itself is expendable, it must have a reliable running life of a few minutes duration, after which it becomes dead weight. There is, therefore, no justification for using a power unit which is not easy and cheap to produce in quantity, or one that cannot be largely produced by unskilled or diluted labor. These requirements are best fulfilled by the rocket motor, either solid or liquid. The ram-jet or athodyd has promising applications for supersonic speeds, but this, for the time being, can be discounted from a standpoint of economical payload.

A prerequisite of the rocket motor is its independence of atmosphere for an oxidant. Ram-jets and turbo-jets, which are dependent upon the atmosphere's oxygen, are limited in ceiling, but such limitations do not attach themselves to units carrying their own oxidant.

The two classes of rocket motors—solid fuel and liquid fuel, are fundamentally similar; the latter possesses considerable advantages in that thrust can be controlled and it has a greater burning time, but for some airborne missiles, which require a short burning time the solid fuels are best suited.

The principle of operation of the rocket motor, irrespective of the type of fuel, is based on Newton's second law. Contrary to popular belief, the rocket is not propelled by the emergence of gases from the furnace, but by the pressure difference acting on the forward end of the chamber. As a simple illustration, consider a sphere filled with gas under pressure; the gas exerts an equal pressure on the walls of the sphere in all directions. If the sphere is perforated at one point no pressure will be maintained on that point and, unless an equal and diametrically opposite reaction is applied, the sphere will move away from the direction of the unopposed pressure. If this motion is to be sustained, some means must be found of maintaining the pressure within the sphere,

and this may be accomplished by providing continuous combustion to generate the necessary pressure.

Solid Fuel Rockets

In the case of the solid fuel rocket the combustion chamber must of necessity be elongated to contain the fuel and preserve the aerodynamic shape, but the rate of burning is reasonably constant and we have an axial reaction on the forward end of the chamber.

Liquid Fuel Rockets

The mechanics of the liquid or bi-fuel rocket is more complicated, but its advantages at present far outweigh any other form of propulsion where a sustained thrust of more than thirty seconds is required. The fuel and oxidant are stored separately in tanks and admitted under pressure to the combustion chamber or furnace in their correct ratio.

Since the furnace temperatures are approximately 2,000°C., some adequate means of cooling must be provided and this is achieved by jacketing the chamber and force-circulating the fuel through the jacket prior to its admission to the furnace.

The fuel and oxidant are forced from their tanks by compressed air or pump, and after pyrotechnic ignition the resultant gases act in a similar manner to the solid fuel motor.

Liquid fuel motors possess the following advantages:

(a) Thrust is controlled by metering the fuel supply.

(b) Chamber temperatures can be controlled by regulating the fuel/oxidant ratio.

(c) The duration of thrust can be controlled by throttling the fuel supply.

(d) The liquids can be piped from any convenient tankage within the rocket.

(e) Center of gravity displacement during burning is less marked.

The fuels used in typical liquid fuel motors are: liquid oxygen; nitric acid or hydrogen peroxide as oxygenators, with alcohol or petrol as hydrocarbons. Various combinations of these or similar fluids are used according to specific requirements.

The Intermittent Jet

The Intermittent Jet was a Messerschmitt *cum* Argus development which, as the propelling unit of the V-1, is familiar to all sections of the community. It is relatively simple, and for a limited range of operation is most economical. This engine does not appear suitable for very high speeds or high altitude, but its performance could be further improved by a more rapid combustion and reduced fuel consumption.

As the name implies, the jet is intermittent in character and the operation is cyclic in the order of 45 to 50 cycles per second. The thrust is produced by several closely connected phenomena, i. e., the ram effect against the closed grill caused by the rapid combustion of gas within the expansion chamber, the cyclic reduction of pressure behind the grills which permits air to pass through for combustion mixture, and the ability to build up a gas pressure prior to combustion due to the inertia of the gases in the tail pipe.

This motor in its present state is subsonic, and some doubts exist whether any envisaged improvements could pull it through the sonic band.

Ram-Jet or Athodyd

The principle of operation of the Ram-Jet and Turbo-Jet are similar, except that in the former no moving parts are involved. Air is used as the oxidant and is compressed by the ram effect through the diffuser, the thrust of the Ram-Jet increasing with the ram pressure. Since this propulsion system develops no static thrust, being entirely dependent upon the intake ram pressure created by its for-

ward velocity, it is unsuitable for speeds under 450 miles per hour. Auxiliary boosters or assisted take-off units will always be necessary for launching to flight velocities above the stalling speed, after which they can be automatically separated; this separation normally occurs between 1,000 and 1,500 feet per second.

Hitherto the Ram-Jet has not been used to carry a pay load, and although it is a promising project theoretically, many practical problems have to be overcome before it is a reliable power plant. The fuels used in the Ram-Jet are petrol or kerosene; in fact any fuel of high volatility and heating characteristics is suitable. So far as is known, solid fuels have not been used successfully, and the problem of introducing solid fuels into this form of combustion chamber, although it is considered well within the bounds of possibility, will involve much development.

Existing Aerial Missiles

In this, as stated earlier, we cannot discount the AA complex. Our problems in defense against these missiles may directly or indirectly exercise all ranks as much as the employment of our own offensive rocket weapons. The air forces at present enjoy some measure of immunity from AA weapons due largely to the fact that successful guidance of such weapons to their objective still present major problems yet to be overcome, while most other classes of controlled weapons have passed into operational employment. Before looking ahead, therefore, let us glance back on the airborne weapons which have won their spurs both as regards accuracy and effect. They are the high-angle controlled bomb, and the controlled, powered glider bomb.

The first can best be regarded simply as a standard bomb with a radio receiver in the tail which translates the signals it receives through mechanical linkage into movement of control surfaces by which means it is steered to the target from heights above the most effective AA defense. Foremost in this class was the *Fritz X* or PC-1400 which, even in extended service trials, obtained twenty per cent accuracy against mobile precision targets.

Germany realized that existing bombs and sights could not, within the limits of her economy, produce the necessary shipping casualties to turn the course of the war in her favor. She enjoyed such a measure of success with her early surprises, using steered bombs, that the Allies were inspired to produce similar weapons, but the war ended before their operational value could be fairly assessed.

Glider Bomb

Another device conceived by the enemy for attacking seaborne communications was the glider bomb, which could be released some 30,000 feet away from the target with no necessity for the parent aircraft to fly near it. In order to increase the attacking speed, one or two rocket motors were fixed to the underside of the missile. These rocket motors powered the glider bomb for ten seconds up to a speed, approximately 800 feet per second, after which it was radio-controlled to the target by the parent aircraft.

Direct visual control was assisted in both types of missiles mentioned by burning a pyrotechnical light in the tail. It will be noted that radio control was not unduly handicapped by flame attenuation, which was only present for the first ten seconds of flight.

The Henschel Aircraft Works produced a very formidable range of power glider bombs, the most notable of which was the Hs-293.

The Allied contemporary weapon in this respect was the American "Bat" which was used operationally in the Pacific; but owing to control difficulties and lack of

suitable tactical conditions it did not achieve any notable success by the end of hostilities.

Air-to-Air Weapons

Two principal air-to-air weapons were brought to the final development stage by the Germans, namely the X-4 and Hs-298. Here again the war ended before either had had much operational use, and their capabilities cannot be judged.

The Hs-298 was radio controlled. The X-4 was controlled by signals transmitted through connecting wires, which were paid out from streamlined bobbins attached to the missile and containing one kilometer of wire.

The inherent disadvantages of the wire link were the range limitations of the wire and restrictions on the attacking aircraft's maneuverability during flight, but these were offset by the advantages of positive control without flame attenuation trouble or vulnerability to radio countermeasures.

Fuzes

The development of high-speed guided antiaircraft weapons is intimately connected with that of proximity and self-homing heads. These hitherto have not figured largely in air armament, but their future is assured. We shall be wise therefore to learn something of their childhood, rather than make their first acquaintance in maturity.

There are many different systems envisaged for proximity fuzes, which include infra-red and radio. One which shows promise consists of a small transmitter radiating a definite energy through its aerial at definite frequency and strength. The characteristics of this aerial are influenced by the proximity of nearby objects and bring about changes in frequency or strength which react on the transmitter and initiate the warhead. This should prove an interesting and important field for development, and it may be that we shall hear more of the proximity fuze in the future.

Torpedoes

As a method of keeping the attacking aircraft out of harm's way, while it directs its missile to a distant target, the torpedo, too, has come in for its share of attention. Various devices have been employed and more are under development. A torpedo cannot be released under random conditions; its underwater trajectory is predetermined by the conditions of entry, and this factor is taken care of by controlling its flight to the surface by attaching wings. These detach themselves at a height determined by a length of wire hanging from the assembly with a training release plummet, which operates on contact with the water.

Stowage of Weapons

External stowage is most certainly doomed. We can no longer hang a multiplicity of stores on aircraft without endangering the crews and aircraft stucture. Although Germany claims that no buffeting was experienced with the external carriage of bombs at 560 miles per hour on the Me-262, this is no criterion for winged missiles or speeds in excess of this figure.

External stowage will probably persist throughout the present generation of aircraft and a large amount of research on future weapons will probably be conducted under these conditions, but it will be incompatible with major advances in aircraft performance, and this factor alone may radically alter our present conceptions of future guided rocket weapons.

Conclusions

It should be emphasized that some of these airborne weapons have been in existence for six or seven years, and if they do not provide the answer to future problems they do at least provide a basis on

which to orientate our present and future ideas.

It is both premature and speculative to predict the commonplace air weapons of ten years hence; they may follow the directions pointed out by Germany in her most energetic and far-sighted period, or they may take a violent offshoot in the near future, according to the aerodynamic dictates of transonic speeds and the possible application of atomic warheads. Anticipation of atomic energy alone may induce development in associate fields to proceed at walking pace, in case its application may necessitate a revision of ideas.

Whether or not we have faith in the power of science and its practical applications we should prepare ourselves for progress with new classes of weapons. It would be a fallacy to wait until they have a reference number before we become familiar with the technical principles involved.

Higher and higher technical standards have been demanded with almost every new piece of equipment. Our responsibilities no longer end when the aircraft takes off, but when the target is destroyed.

Radar, aerodynamics, sustained rocket propulsion and atomic energy do not belong exclusively to the scientist, though many would have it so. Science and its technical application are as inseparable as thought and action. It is only by widespread technical appreciation following close on the heels of scientific research that we can keep on top of our subject and maintain that state of preparedness so necessary in an unstable world. By so doing, we shall avoid the necessity for training programs which have to bring half-knowledge to many thousands in the shortest time in order that a few shall know how, when called upon.

By maintaining high technical standards with the widest appreciation of technical principles we, as users, can teach scientists the way to operational reality. If we fail in this we can but blame ourselves for being foisted with cumbersome, impractical weapons whose shortcomings are safeguarded by voluminous instructions.

The 4th Colonial Infantry Division in the Campaign of France (1939-1940)

Translated and digested by the MILITARY REVIEW from an article in "Revue des Troupes Coloniales" (France) November-December 1946.

LIKE the 5th Colonial Infantry Division, the 4th Colonial Infantry Division was engaged on the Somme in May and June of 1940.

The main elements of the 4th Colonial Infantry Division were the 2d Regiment of Colonial Infantry, the 16th and 24th Regiments of Senegalese Rifle Troops, the 12th and 212th Regiments of Colonial Artillery.

As in the majority of large units of 1940, the division antitank and antiaircraft equipment was very meager, but the 75s, already obsolete, did a great deal of firing. The forces were numerically weak. A large number of men were on furlough when the German offensive started, but they returned to their units about the first of June.

The Battle of France

It was in this situation that the *blitzkrieg* caught the division. Like the majority of the units that could be dispensed with in the east, it was shoved westward and hurled into the melee. Entraining on 17 May in the northeast portion of the Sarrebourg area, it suffered serious de-

lays. Even before its arrival on the battlefield the division had lost more than thirty officers and 200 men. Between 19 and 23 May, the division arrived in position south of the Somme, in the area: Ailly—Breteuil —Creil.

Establishment of Contact

From 19 to 24 May, the units moved slowly to their positions against the mass of refugees fleeing southward. The German action became more and more intense, but opposite Amiens were light elements only, which permitted the main body of the division to assume position.

At the beginning of the battle of the Somme, the sector of the 3d Colonial Light Division began at Picquiny; on its right, opposite Amiens, was the 13th Infantry Division, then the 7th Colonial Infantry Division. To the east of the 4th Colonial Infantry Division was the 7th North African Infantry Division which was in contact, on its right, with the 19th Infantry Division.

At Breteuil, the division received the mission to hold the Avre, from Boves to La Neuville-Sire-Bernard, but a counterorder sent it to a position along the Somme, from Camon to Chipilly.

The burning of Amiens filled the sky at dawn on 20 May, and Bray and Amiens were occupied by the Germans at 1000. By 0800 the enemy held Corbie, and the bridge had been bombed.

In the face of a German armored threat from Amiens, the commanding general pulled back the motorized platoons of the Division Reconnaissance Group. Unfortunately, this movement was effected before the bridges over the Somme were completely destroyed.

By this time, the first elements of the 2d Colonial Infantry Regiment were arriving at Ailly-sur-Noye. The heavy weapons and headquarters companies were pushed westward as far as Jumel and Ailly.

The artillery began to detrain under enemy bombardment, and the first batteries were thrown into the battle toward Merville and Morisel to serve as antitank pieces. Likewise the 24th Senegalese Regiment assumed a hasty defensive position toward Dommartin, Thezy, Hailles and Castel, but were drawn back to the line: Ailly—Moreuil.

Between the enemy and Esserteaux, a few cavalry troops and guns were all that was available to stem the enemy tide which appeared ready to pour over the Somme.

On 21 May, the 1st Battalion of the 2d Regiment detrained at Ailly and pushed one company as far as Remiencourt and Guyencourt. The 1st Battalion of the 16th Regiment occupied Sauvillers-Mongival, then Rouvrel. As they arrived, the artillery batteries were hurried into action to support the infantry units.

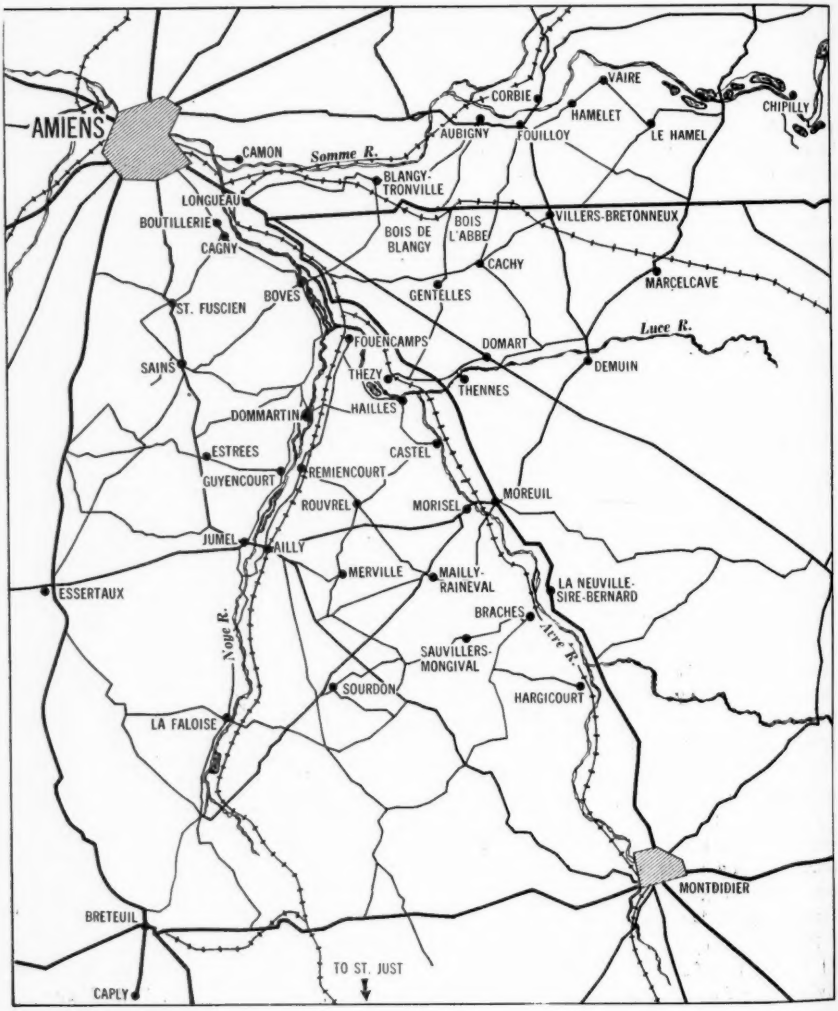
The same day, the mounted troop detrained at Saint-Just. It was sent to Braches and Hargicourt on the Avre. On the following day, 22 May, it joined forces with the Division Reconnaissance Group. The latter held a position from Boves to Marcelcave, passing through the Gentelles woods and Cachy.

The 2d Battalion of the 2d Regiment, having arrived at Ailly-sur-Noye, relieved the 1st Battalion which in turn took position between Dommartin and Fouencamps, facing the north and west. The 1st Battalion of the 16th Regiment moved to the north edge of Bois l'Abbe and Villers-Bretonneux. Contact was established on the east with the 10th Moroccan Rifle Regiment and the 7th North African Infantry Division.

The 24th Regiment which arrived later, had its 1st Battalion at Rouvrel and its 2d at Merville.

Attacks Toward the Somme

The period from 23 May to 28 May comprised our drive toward the Somme, despite incomplete organization and insufficient support by armor and aviation. The


AMIENS
CAMON
Somme R.
AUBIGNY
CORBIE
VAIRE
HAMELET
FOUILLOY
CHIPILLY
LE HAMEL
BLANGY-TRONVILLE
LONGUEAU
BOUTILLERIE
CAGNY
BOIS DE BLANGY
BOIS L'ABBE
VILLERS-BRETONNEUX
CACHY
MARCELCAVE
BOVES
GENTELLES
ST. FUSCIEN
Luce R.
FOUENCAMPS
DOMART
SAINS
THEZY
DEMUIN
THENNES
HAILLES
DOMMARTIN
CASTEL
ESTREES
GUYENCOURT
REMIENCOURT
MOREUIL
ROUVREL
MORISEL
JUMEL
CAILLY
MERVILLE
MAILLY-RAINEVAL
LA NEUVILLE-SIRE-BERNARD
ESSERTAUX
BRACHES
Noye R.
Avre R.
SAUVILLERS-MONGIVAL
SOURDON
HARGICOURT
LA FALOISE
MONTDIDIER
BRETEUIL
TO ST. JUST
CAPLY

enemy, however, was solidly installed, his matériel superior, and he could not be thrown back across the Somme. Incomplete destruction of the bridges across the river permitted him to be reinforced at will.

On the east, the sub-sector was held by the 16th Regiment, which occupied Villers-Bretonneux and a part of Bois l'Abbe. The center sub-sector was occupied by the 1st Battalion of the 24th Regiment (Bois de Blangy, Bois l'Abbe Gentelles). The 3d Battalion was at Sourdon.

On the west, the sub-sector of the 2d Regiment was greatly extended. Its 1st Battalion occupied Fouencamp, Dommartin and Remiencourt. The 2d Battalion was in reserve at Ailly-sur-Noye. The 3d Battalion was headed in the direction of Ailly.

The front limit of our lines was marked by the northern edge of Boves, and the edges of the Bois de Blangy and Bois l'Abbe, and by Villers-Bretonneux. Artillery support was still incomplete.

The mission assigned the 4th Colonial Infantry Division was to force the enemy back on the Somme, to cross the river, to establish a bridgehead at Corbie, and to exploit the success toward the north. The artillery groupment had at its disposal three batteries of 105s, and two batteries of 75s.

At noon on the 23d, the rifle squadron of the Reconnaissance Group attacked in the direction of Fouilloy. The attack was resumed by the 3d Battalion of the 16th Regiment, starting at Villers-Bretonneux, but a violent counterattack threw the Senegalese back.

On 24 May, in the western part of the sector, the 2d Regiment, occupied Boves and Hill 82, near Saint-Fuscien, with its 2d Battalion. This battalion was replaced, as a division reserve, by the 3d Battalion at Ailly-sur-Noye.

The attack on Aubigny was launched by the 1st Battalion of the 24th Regiment, but enemy artillery laid down a violent barrage, and Stukas soon reinforced the barrage. In the face of a German counterattack the command gave the order to fall back. On the east, the same day, the attack on Fouilloy was resumed by the 16th Regiment without tank support. The advance of the 24th Regiment in Aubigny did not overcome the resistance to the southeast of Aubigny, and the front line was moved back under cover of darkness.

The 3d Battalion of the 24th Regiment again attacked in the direction of Blangy. The banks of the Somme were reached, but a violent counterattack was launched on the right flank. The Senegalese were considerably demoralized and fell back.

On the right, the 16th Regiment had received the order to reach the Somme. The 2d Battalion occupied Le Hamel during the night, but suffered serious losses as it approached Vaires-sous-Corbie.

Reorganization of the artillery was carried out during the night of the 25th-26th. The following day, enemy air activity was not so pronounced, and relief movements within the 2d Regiment were easier.

The right sub-sector was held by the 16th Regiment, supported by the artillery of the 1st Battalion, 12th Colonial Artillery Regiment; and the 6th Battalion, 212th Colonial Light Artillery Regiment.

The central sub-sector was held by the 24th Regiment, supported by artillery of the 2d Battalion, 12th Colonial Artillery Regiment; and the 3d Battalion, 212th Colonial Heavy Artillery Regiment.

The left sub-sector was held by the 2d Regiment, and artillery of the 3d Battalion, 12th Colonial Artillery Regiment; and 2d Battalion, 212th Colonial Heavy Artillery Regiment.

The framework of this organization remained practically the same until 7 June.

On the western sector the offensive was ended. The command ordered our forces to form closed strongpoints which were to resist without retreat.

On the east, however, the offensive continued. Units had been reorganized, and food and ammunition replenished.

The African regiments began the attack on Fouilloy and Aubigny at 1900, 28 May. Tank support was reduced to one company which, attacked by enemy aviation and artillery, was not able to overcome the resistance at Fouilloy.

Air support and the tanks at Aubigny were ineffective. During the night, we fell back to the north edge of Bois l'Abbe. The operation was very costly.

Thus came to an end, on the afternoon of 28 May, what may be called the offensive period of the 4th Colonial Infantry Division. Undeniably, it was not crowned with success. The enemy knew too well the value of his bridgehead south of the Somme.

The Defensive Battle

The division had to defend a front of nearly twenty kilometers. In spite of losses, its morale remained high. Defense measures were carried out and antitank mine fields laid. Water, food, and ammunition sufficient for a week were stored in strongpoints. The artillery took a leading part in the defensive battle that followed. By the afternoon of the 29th, strong enemy elements appeared and began forming an attack on Bois l'Abbe, but the artillery broke it up.

The 2d Regiment maintained the same disposition. The 24th Regiment occupied Bellevue, le Petit Blangy, Blangy-Tronville, the Boves station, the Gentelles woods, Bois de Blangy and Bois l'Abbe.

In the afternoon, the 3d Battalion of the 16th Regiment, at Hamel, was threatened with encirclement. The enemy had crossed the Somme between Vaires and Bouzencourt with considerable forces.

On 31 May, at daybreak, a platoon of motorcycle scouts of the 16th Regiment and remnants of two companies of the 24th Regiment reestablished contact with the 16th Regiment at Vieres woods without loss.

On 1 June, the enemy continued to attack with dive bombers and strafing fire. Over the entire front of the sector, labor and preparational activity continued feverishly.

In each sub-sector, infantry and artillery constituted centers of resistance with common command posts. The ammunition supplies in the positions were raised to four units of fire.

On 5 June, two days after Dunkirk, the Germans began their offensive, with their main effort directed against the Somme.

On the west, the 16th Infantry Division position was completely pierced. The enemy's 10th Armored Division, followed by the 29th Motorized Division, penetrated at least fifteen kilometers. The tactics of the closed strongpoint attained some success, but the encircled and submerged strongpoints fell one after another. The enemy also carried out diversionary operations against the 24th Regiment.

In the same way, the northern edges of Villers-Bretonneux and Hill 104 were subjected to violent bombardment, and the enemy attacked at 0530.

June 6 passed quietly, but the German offensive on the east and west continued without interruption, supported actively by aviation.

The 4th Colonial Infantry Division and its neighbors, under far too much pressure now, were forced to fall back. In the night, the regiments received orders to retreat to a line 1,500 meters northwest of Braches.

The Withdrawal

The movement of the 1st and 3d Battalions of the 2d Regiment took place without incident. But the 2d Battalion covering the withdrawal, was violently attacked.

The 24th Regiment succeeded, despite aerial bombing and machine-gun strafing, in assuming an adequate defensive disposi-

tion, the 3d Battalion at Merville, the 2d at the l'Arrière-Cour woods, and the 1st at Thory.

The 16th Regiment broke contact with the enemy in good order. The ammunition depot was blown up, but many supplies were left behind. The route followed by the 16th Regiment was the best route in the sector, but it was also the route of the 7th North African Infantry Division, and serious traffic jams and delays resulted. Nevertheless, the 1st Battalion succeeded in installing itself at Braches. The 3d Battalion held Sauvillers-Mongival and the 2d was at Aubvillers in division reserve. The groupments of division artillery were distributed south of the line: Thory—Sauvillers-Mongival.

The night between the 7th and 8th was used for hasty organization of the terrain and distribution of supplies. While the Division still held firmly, the enemy arrived at 1200 at Breteuil, at Saint-Just at 1530 and at Clermont at 1630, thus outflanking the Division positions.

At Merville, the 3d Battalion of the 24th Regiment stubbornly defended its positions. From dawn till 1700, the enemy continued to attack and filter into the position.

The 2d Battalion also put up a magnificent resistance in front of l'Arrière-Cour woods. Unfortunately, ammunition was rapidly running low, and the artillery park had been cut off from the rest of the division.

In the afternoon the enemy increased his effort on the front of the 16th Regiment, and Mailly-Raineval fell between 1600 and 1900.

The Fatal Day

The situation became so serious that withdrawal was unavoidable. The march during the night between 8-9 June was extremely hard. For three days there had been no regular issues of food or other supplies. The men had to make their way through the artillery columns, trains, and supply columns belonging to four different divisions. The elements of the division were stretched out over fifty kilometers. The day which followed was one of extraordinary confusion. The division was practically surrounded by the German advance in the west. Bridges over the Oise were destroyed.

The 2d Regiment had received orders to fall back on Quinquempoix and Brunvillers. The maneuver was accomplished during the night. The 1st Battalion halted at la Morlière woods and was soon encircled. There then remained of the regiment only the 3d Battalion and the regimental companies. As the pressure grew, the retreat was ordered diverted through Maignelay, Revenel and Angivillers, but the 3d Battalion was unable to get out of Brunvillers.

The 24th Regiment had remained the least affected. It moved across country, through Grivennes, Villers-Tournelle, and Broyes. Angivillers was reached toward 1800.

In the middle of the forenoon, the southernmost elements encountered German forces and the division gave the order to move southeast toward Pont-Sainte-Maxence.

The withdrawal of the 16th Regiment was similar. At dawn, the first units of the regiment arrived at Plainville. The order had been given to go to le Plessier opposite Saint-Just, with the 1st and 2d Battalions covering the flanks and rear of the cumbersome retreating column. The men were worn out, fighting by day and marching by night, but their morale was still good.

The 1st Group of the 12th Regiment of Colonial Artillery, after breaking contact south of Sauvillers, passed through two artillery barrages and twice escaped from attacks of German scout cars, but the third attack cut the group in two.

Two kilometers from Estrèes-Saint-Denis, the 7th Battery, surprised by several German armored vehicles, was anni-

hilated. Between Lieuvillers and Angivillers the 9th Battery met a similar end.

In the afternoon, units of the 2d Regiment, shut up in Brunvillers, attempted a dash toward Ravenel, supported by a battery of the 7th North African Infantry Division.

At Angivillers, diverse elements were assembled, the majority of them completely exhausted. A breakthrough southeast toward Lieuvillers was attempted, but all these movements were doomed to failure. During the morning of the 10th, in the villages around Saint-Just, isolated elements continued to fire on the enemy.

The Martyrdom of the Division

At Erquinvillers, elements of the 24th and 16th Regiments ran onto the Germans already occupying the village. They were obliged to surrender. They were disarmed, and hurriedly sorted, on one side the whites, on the other the blacks. The black rifle troops were taken to the edge of the highway and cut down with machine-gun fire. Other wounded men lying in a barn were dragged into the road and killed.

At 1900 on 9 June, while the village was encircled, remnants of the 24th Regiment and the 2d Battalion of the 16th Regiment decided to force their way southward. They reached the Eraines woods but in the afternoon the Germans encircled them. The little detachment surrendered. The prisoners, disarmed, were again sorted. The Germans executed the black rifle troops one by one.

After 10 June, the 4th Colonial Infantry Division practically ceased to exist. All that remained were the division artillery park; motor transport company; division medical unit; part of the headquarters of the 3d Battalion, 306th Artillery Regiment; 2d Battalion, 12th Regiment; 6th Battalion, 211th Regiment; 350 men of the 16th Regiment; 150 of the 2d Colonial Infantry Regiment; 50 of the 24th Regiment; and the Division Reconnaissance Group of three or four platoons. Nearly all of its infantry had disappeared; a large part of its artillery had not been able to cross the Oise; the division services had been broken up and scattered. Its courage had been overcome only by the crushing material superiority of the enemy.

Principles of War

Digested by the MILITARY REVIEW from an article by Commander J. H. Unwin, in "Journal Royal United Service Institution" (Great Britain) May 1947.

FROM time to time one hears that there are no such things as Principles of War, and in these days of mechanical progress and the development of new weapons, the same idea is prevalent in many circles. It should be both of value and interest, therefore, to take the standardized Principles of War and to examine them in the light of the events of the late war and see whether their application proved successful, or their neglect, fatal.

Maintenance of the Object

It has been asserted that the first great Principle of War is Maintenance of the Object. With it go the other two major Principles—Offensive Action and Concentration. History is studded with examples of commanders who failed because they did not always keep the object in view, but allowed themselves to be led away down attractive but unessential side lanes. It is curious how the Germans, who are tactically magnificent soldiers, so often made large mistakes in the strategical sphere. These mistakes appear usually to have been due to failure to keep the ultimate

object constantly in view and to subordinate all else to it. There are many notable examples of this in the late war. In 1942, in their summer offensive in Russia, the Germans appear to have started with one object—to cross the Volga and then sweep around behind it to the north to capture Moscow and to envelop a large portion of the Russian Army. If they had stuck to this one object alone and used all their forces to achieve it, they might well have been successful. But the successes that attended their initial advance in the spring must have gone to their heads, and they split their forces to go for a second object—the capture of the oilfields in the Caucasus. The result is history: the northern armies were halted at Stalingrad, and after a long and gigantic struggle were beaten back and a very large number surrounded and captured; the Southern armies were finally halted and turned back at the very gates of the oilfields. The failure to stick to the primary object and the addition to it of the very attractive and potentially profitable Caucasus adventure caused a complete breakdown of the German plans and started the retreat which was the first step from the Volga to the Oder.

Another example was the efforts of the Germans to neutralize our Eastern Mediterranean fleet during the early and middle months of 1941. They attempted to achieve this by air attack, and it is true that in the Central Mediterranean the fleet was mauled and forced to retire to the eastern end. Here the Germans began bombing raids on it in Alexandria and laying mines with the object of bottling up the fleet and closing the Suez Canal to shipping. The raids on Alexandria were small and badly carried out. The minelaying was, however, much more dangerous and threatened very severely to dislocate traffic. But then the Germans stopped, presumably to send their aircraft up to the Russian fronts. Had they not only continued these raids but also very much increased the scale and intensity of them, things might have looked much blacker; the Mediterranean Fleet might have been immobilized and, in this case, probably Egypt and the whole Middle East bastion might have been lost.

Another example, which is closely bound up with neglect of the Principle of Concentration, is the failure of the Germans to devote all their efforts to the destruction of our seaborne supplies of food and materials. After the failure of their plan to invade this country, they obviously and quite correctly appreciated that short of invasion, destruction of our merchant shipping, and so of our food supplies, was the only way to defeat this country. They used their submarines continuously and bravely to achieve this object. But they sent out only two raiders—the *Graf Spee* and the *Bismarck*, and these singly and at different times; both succumbed to concentrations of our forces. Their aircraft were never used intensively against our shipping nor in concentrated and continuous attacks against the ports through which our seaborne merchandise had to come. Had the Germans kept this one end—the destruction of our merchant shipping—in view they would surely have concentrated all their forces on it and have attacked our ships at sea with all available submarines, aircraft and surface ships, and have concentrated all bombing attacks on our western supply ports. By this means we might well have been brought close to disaster in the early part of 1941.

Offensive Action

Victory can only be won by Offensive Action: that is the great psychological principle. The offensive confers the initiative and with it liberty of action and the denial of it to the enemy. That was clearly demonstrated in the late war. Once the enemy's initial assaults had been held we, owing to our command of the sea,

were able to exercise our offensive strength wherever we wished. We had freedom of action and the enemy had to dance to our tune. He tried to be strong everywhere and to surround the whole of Europe with an impenetrable wall, to turn it into an impregnable fortress, *Festung Europa;* the result we all know; the invasions first of North Africa and then of Sicily, Italy and finally Normandy and the South of France, all made possible for us by the old and ever-present weapon of sea power.

Admiral Sir Philip Vian's protection of a convoy against greatly superior forces in March 1942, provides another excellent example of the power of the offensive. The convoy was proceeding westwards to Malta, protected by four small cruisers, one AA cruiser and some ten destroyers. After beating off many air attacks, an Italian surface force, consisting of the *Littorio*, one or two heavy cruisers, three light cruisers and a flotilla of destroyers appeared from the northward. Leaving his convoy lightly screened, Admiral Vian at once led his small force of four cruisers and six destroyers toward the enemy. After a series of brilliant maneuvers consisting mainly of making a smoke screen and dashing out of it to harass the enemy and darting back into it for cover, a most gallant torpedo attack by the destroyers succeeded in putting one torpedo into the *Littorio*. The enemy turned and ran.

Another example is provided in the Battle of the Atlantic. In the early days we had only sufficient forces to be able to provide escorts for our convoys—a defensive strategy. But, as our resources grew, we were able to use some of them in an offensive role. Defensive cover was provided for threatened convoys, while all other available effort, both sea and air, was devoted to attacking the U-boats. Special escort groups were formed to seek out and attack the enemy; of these, perhaps the most famous was commanded by the late Captain Walker in the *Starling*. Aircraft were used to "flood" certain areas through which the U-boats had to pass, and also to attack U-boats on the surface concentrating on a convoy. By the use of offensive action, the U-boat menace was held, and sinkings of U-boats gradually increased.

After the evacuation of Dunkirk, from 1940 until the landing in North Africa in 1942, the only offensives possible to us from the United Kingdom were bombing raids and small amphibious raids on the coasts of France and Norway. With the very limited forces available, these may not have had much effect in themselves; but they did pay large dividends, both psychologically on the morale of the people in that they knew we were doing something and attacking somewhere, and also from a training and experimental angle in that thereby we were trying out and perfecting new material and technique.

Concentration

The third great principle is usually inextricably bound up with the other two—Maintenance of the Object and Offensive Action—for the object must be ruthlessly pursued with the maximum Concentration of Force.

The Germans first showed us how well they understood the tactical advantages of Concentration. Their initial breakthrough at Sedan and their use of armored columns as a battering ram to penetrate the enemy's lines are excellent examples of this. Yet in the wider strategical sense, they seem to have neglected it. Examples of this are given under Maintenance of the Object—the German assault on Stalingrad and the Caucasus in 1942, and their attacks on our shipping in port and at sea.

Our final technique of heavy bomber attacks also gives an excellent example of this principle. Here the operations of a very large number of heavy bombers

were not only concentrated in space—on one target—but also in time, the actual attack being compressed into the shortest possible period. It was not until we began to use these tactics that our heavy bomber attacks began to pay dividends.

Another example can be taken from the Battle of the Atlantic, this time from the enemy angle. When in the early part of the War the Germans found their U-boat attacks unsuccessful they changed their tactics. They spread their U-boats in the probable path of a convoy; as soon as one boat intercepted the convoy a sighting report was made and the whole pack, some thirty to forty boats strong, concentrated on the convoy. Not until this concentration was complete was the attack launched. These tactics achieved great success, and for a time our merchant ships sinkings were very heavy. They were only overcome eventually by methods which included Mobility—the evasive routing of convoys; Concentration—more ships in each convoy so that convoys were made more difficult to locate; and Offensive Action against the U-boats in packs and when proceeding at high speed on the surface to concentration.

Economy of Force

The principle of Economy of Force covers the correct distribution and employment of all forces. There must always be a compromise between the two principles of offensive action and concentration on the one hand, and security on the other. To a large extent, the correct balance dictated by the principle of economy of force is governed by mobility.

Perhaps one of the most outstanding examples of the correct appreciation of this principle is provided by the fact that even during the worst times of 1940, when invasion appeared imminent, we were shipping men, guns, tanks and aircraft to the Middle East to strengthen our woefully weak bastion there.

Surprise

Surprise can be of several types: operational surprise—either strategical or tactical; the surprise of a new weapon; or the surprise of a new technique. Many examples can be taken from the late war.

The German breakthrough at Sedan is an excellent example of surprise both tactical and of technique. We did not expect the Germans to attack in the Ardennes through that most difficult, closely-wooded, hilly country nor, despite the lesson of Poland, were we prepared for his successful technique of using his armored forces as an initial battering ram and a speedily advancing column.

The Battle of El Alamein provides an excellent example of concentration and of the traditional use of surprise. The sudden concentrated assault of our armored forces, very cleverly masked beforehand by highly-detailed measures of deception, took Rommel by surprise and produced a situation from which he never recovered.

Perhaps the most successful surprise afforded in the war by a new technique founded on a new weapon is to be found in the British use of radar as an air raid warning system, and then as a fighter interception system.

Mobility

Mobility is a no less important principle of war. It covers among other things: speed of decision on the part of the commander; the strategical and tactical disposition of forces; good communications; and the speed of movement and endurance of our forces.

Mobility is one of the chief factors in naval strategy, and many examples of naval mobility can be taken from the last war. The Navy, with its carefully-thought-out and equipped bases disposed throughout the world, is essentially a mobile force. Good examples are the rapid and effective concentrations of force to deal first with the *Graf Spee* and later

with the *Bismarck*, and in providing effective escorts for a succession of Malta Convoys from ships who were, sometimes a fortnight before, thousands of miles away.

In the Pacific War, air power was necessary to provide initial softening, then support and cover for the assault forces. Owing to the large distances and lack of equipped airfields, shore-based aircraft could not be used. Air forces, though tactically very mobile, are still strategically very immobile. Carriers in large numbers were produced and the necessary air power was provided by ship-borne aircraft.

Security

Without security, a force loses its freedom of action and must conform to the enemy's wishes, and unless the base be secure, offensive action is impracticable. But this principle must not be held to justify undue caution and avoidance of all risk. Bold planning and execution, founded on a secure base, is the foundation of success in war.

The outstanding example of security in the late war was the successful efforts made to keep Great Britain secure as a base from which to attack the Germans. Nevertheless, this was never taken to mean that all our strength had to be kept at home, e.g., the sending of powerful naval, military and air forces to the Middle East even in the worst time of 1940.

Cooperation

The most striking examples of cooperation in the late war were, of course, the great combined assault landings in th Mediterranean, in Normandy, and the F East. These could not have been carr out so successfully without complete c operation between the services. Combine assaults are justly rated the most difficul operations of war, and our records of th in the past have not been universally hap py or successful.

A nation's full strength can only be achieved with complete and effective co operation between all component parts o a force, between all three services, and between the services and the civil power of the country. The war effort of this country in the recent total war is truly a magnificent example of cooperation.

Conclusion

Enough has been said, it is hoped, to show that the well-established principles come out extremely well in any analysis of operations of the late war. Further consideration would confirm that the Germans, headed by the best General on the Allied side—Corporal Hitler, neglected these principles to a staggering degree in major matters, whereas we on our side although, of course, not always right, mad many fewer transgressions. Nevertheless principles are a guide, but not an auto matic key to success. Napoleon's famous dictum still holds good, "It is not some unfamiliar spirit which suddenly discloses to me what I have to do in a case unexpected by others; it is reflection, meditation."